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	Date	Name	Signature
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Abacus junior vet5

Hematology Analyzer

User's Manual

1.06 Release

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Contents

1. INTRODUCTION

1.1   Intended Use

Abacus junior vet 5 hematology analyzer is a fully automated cell counter designed for *in vitro* diagnostic use.

The compact instruments were developed for small clinics, point-of-cares and vet offices.

1.2   The Instrument

Abacus junior vet 5 is a fully automated, bench top hematology cell counter.

It implements the so-called Coulter-method for counting cells passing through a small aperture, and measures the hemoglobin content of red blood cells.

The analyzer features a graphical LCD display module and a foil keypad of 29 keys including 6 software buttons (with icons), 6 function keys (above LCD) and has a START button.

The instrument allows sending results to an external printer, or can have an optional built-in printer module.

Its internal memory is capable of storing 2000 records with full histograms, and individual patient data. QC measurements can also be performed, and stored. The software operating the instrument is easy to upgrade using a USB drive. The instrument allows connecting to a host computer for uploading records stored in the memory through a USB SLAVE port or serial link, and also enables archiving and restoring records to and from USB drive.

NOTE: **If the equipment is used in a manner different from which the manufacturer specified, the protection provided by the equipment may be impaired. Misuse of equipment or use other than its intended purpose will invalidate conditions of warranty. The accuracy and precision may also be impaired.**

1.2.1　Patient Testing

The analyzer can process 24-30 samples per hour in 3-part mode, 16-20 samples per hour in 5-part mode. Samples can have individual sample data, and additional parameters.

Results can be printed on the optional internal or external printer. The print-out format can be customized by the user.

Abacus junior vet 5 determines 22 hematology parameters including five-part WBC differential in 5-part mode. The instrument requires 50 μl (2 x 25μl) of the whole blood sample:

WBC	total white blood cell count
LYM	lymphocytes count
MON	monocytes count
NEU	neutrophil count
EOS	eosinophil count
BAS	basophil count
LYM%	lymphocyte percentage
MON%	monocytes percentage
NEU%	neutrophil percentage
EOS%	eosinophil percentage
BAS%	basophil percentage
HGB	hemoglobin
RBC	red blood cell count
HCT	hematocrit
MCV	mean corpuscular volume
MCH	mean corpuscular hemoglobin
MCHC	mean corpuscular hemoglobin concentration
RDWc	red cell distribution width
PLT	platelet count
PCT	platelet percentage
MPV	mean platelet volume
PDWc	platelet distribution width

1.2.2   **Reagents**

Only reagents supplied by the manufacturer should be used with the analyzer, otherwise accuracy cannot be guaranteed.

Diluent:	Isotonic saline solution used to dilute whole blood specimens and to rinse the fluidic system between measuring procedures.
Lysing reagent:	Used to create hemolysate for 3-part WBC differential and for total WBC and HGB.
Cleaner:	Used to perform cleaning process of the fluidics.
Rinse:	Used in cleaning process of the fluidics.
VET5:	Used to dilute whole blood and differentially hemolyse white blood cells to separate eosinophil granulocytes from other WBC by volume. It is suitable to determine EOS, EOS%, BAS and BAS% parameters.

1.2.3   Technical Operation

As *Abacus junior vet 5* is a fully automated instrument, operating it requires minimal training or technical support. Operator interaction is reduced to the following:

- Perform a *Blank Measurement* in case the instrument is not used for a specific time
- Enter sample and/or patient data
- Apply the sample for analysis
- Print results either one-by-one, or in groups by selecting records from the database
- Perform simple weekly maintenance, as described later in this description (7.1).

1.2.4   Calibration and Quality Control

Abacus junior vet 5 arrives at your laboratory factory-calibrated and ready to use. However, calibration needs updating whenever you find that the results have slightly changed, or a different or new control material is used. With each control material you receive to be used with the instrument, you will find a control sheet listing the parameters the instrument should match. Perform these calibrations as explained in a later chapter (7.2).

Quality Control is used for checking for proper calibration and performance of the analyzer. Running these samples should happen on a regular basis, as also explained in a later chapter (7.3).

1.3   Instrument features

Figures 1 and 2 show front and rear view of *Abacus junior vet 5* hematology analyzer.
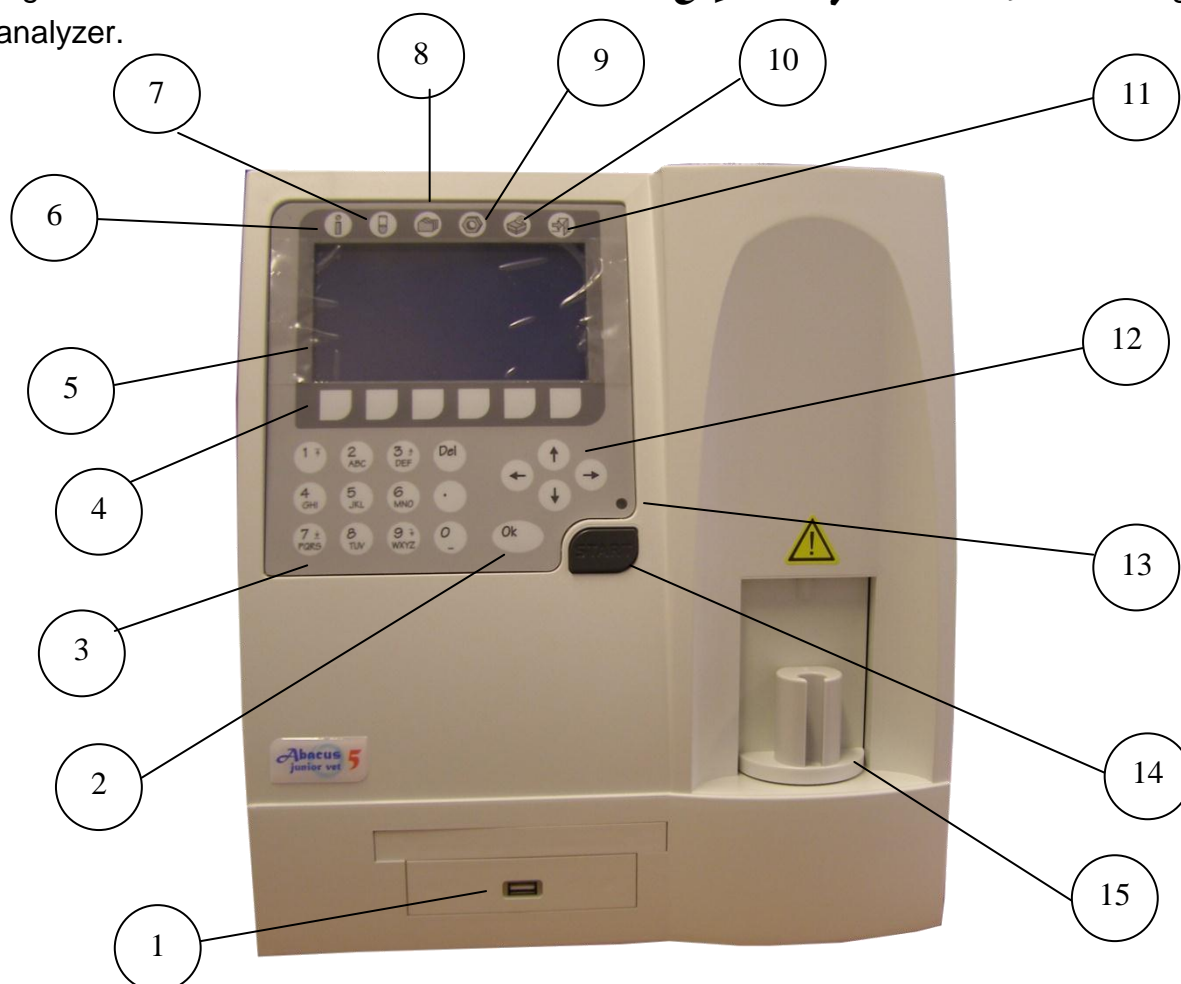
Figure 1. Front view

1.   USB connector
2.   OK key
3.   Numerical keypad
4.   Function keys
5.   Graphic liquid crystal display
6.   HELP key
7.   Measure function key
8.   Database function key
9.   Utilities menu key
10.   Printing function key
11.   Exit menu key
12.   Cursor control keys
13.   Status indicator
14.   START key
15.   Sample rotor (with interchangeable adapters)

Figure 2. Rear view

1. Reagent tubing connections
2. On/Off switch
3. External power supply inlet 12VDC
4. USB A port
5. Serial port (RS 232)
6. USB B port
7. Keyboard connector (PS2)

The analyzer is equipped with built-in printer allowing immediate report generation. Abacus Juinor VET5 is designed to support two printer models; a Seiko and an Axiohm model. Both printers use 58mm wide thermal roll paper.

Installation of the printer is a factory option. Each analyzer that has the built-in printer option will be equipped either with the SEIKO or with the AXIOHM printer module.

The SEIKO model has a flat top panel with color matching that of the instrument cover. To open its lid, press the black button. Just let the thermal printer paper fall into the housing with its open end toward the black roller. Holding the open end of the paper, close the lid so that the end of the paper gets clipped between the black paper guide and the printer mechanics.
You can select to use this printer in the "**Printer Settings"** menu (see chapter 7.5.1).

Paper guide

Thermal paper

Printer mechanics
(inside)

Lid opener button
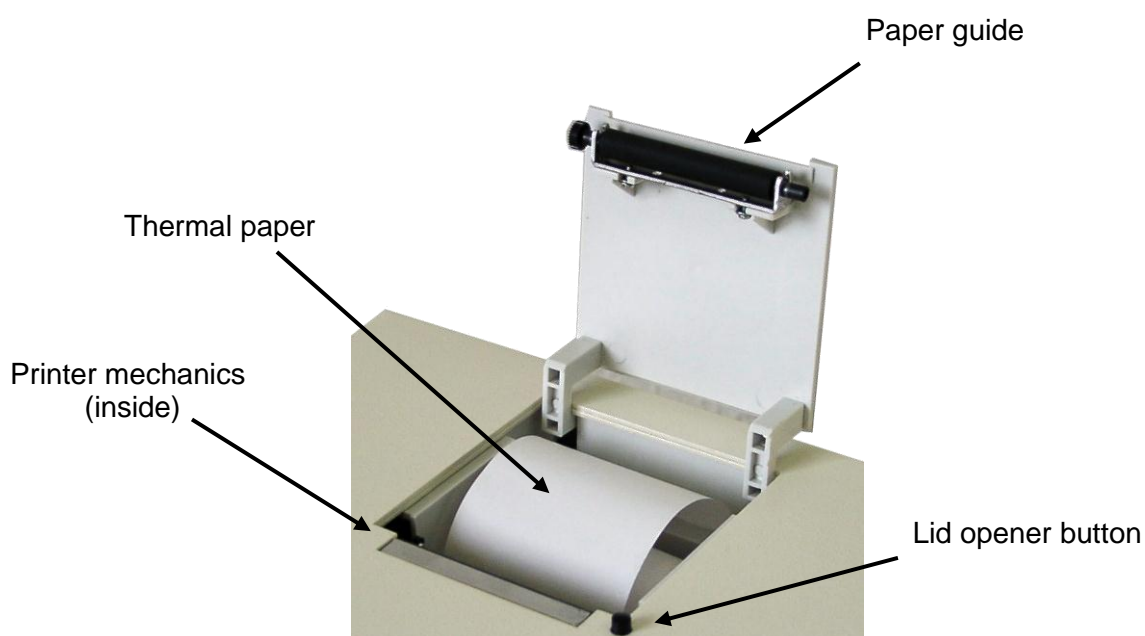
Figure 3. Built-in printer

The AXIOHM printer has a black cover. It also has a blue status light, that blinks when the printer paper is out.

To replace paper in the printer:

- open the paper lid (pull the lid upwards by the handle)
- remove central plastic roller of old paper roll
- unwind new paper roll, so that the "starting edge" is coming from down under towards you

- gently drop the new roll into the holder of the printer, and hold the "starting edge" with your hand, and make sure it comes out on the front of the printer

- close the lid, making sure that the paper is captured between the lid and the front of the printer

The analyzer works with an external power supply. The next figure shows the power supply unit generating 12VDC. The power supply module has a so-called auto range input, allowing operation on 230V or 115V power system. The power supply complies CE and UL safety certifications.

The input socket is a standard power cable connection, the output is a special, lockable socket as shown in the picture.

Only the provided power supply shall be used with the instrument. ("Protek Electronics Corp." Model ID: PUP80-12-N8, or "GLOBTEK INC", Model ID: GT-81081-6012-T3")

1.4   Parts of the Analyzer

Abacus junior vet 5 hematology analyzer is composed of three main units:

Fluidic System:	Performs sampling, diluting, mixing, and lysing and Lyse2 lysing functions. Generates the regulated vacuum used for moving cells through the aperture during the counting process.
Data Processing System:	Counts, measures and calculates blood parameters, generates and stores numerical results and histograms.
Control Panel:	Features an LCD display, a 29-button keypad, and USB and serial (computer) interfaces.

1.4.1   Function of the Fluidics

For the Schematics of the fluidics system, see Section 9.

Sample aspiration and dilution:

	Stages of the blood testing process
a.	25 μl of anti-coagulated (EDTA) whole blood sample is aspirated through the sampling needle, mixed with VET5 reagent and diluent for the 5-part differentiation.
b.	After the first counting and washing process, another 25 μl of anti-coagulated (EDTA) whole blood sample is aspirated again and mixed with 4 ml of **diluent** and stored in the chamber (mix dilution).
c.	25 μl of the mix dilution is aspirated into and stored in the needle during WBC

	measurement and the hemoglobin analysis
d.	**Lysing reagent** is added to the mix dilution held in the chamber for WBC differential analysis. This amount of **lysing reagent** is species dependent and may be changed by the operator within "Limits" menu.
e.	After WBC counting and a washing process, 5 ml of diluent is added to the second dilution (using the 25 µl of mix dilution stored in the needle).
f.	This portion is analyzed for RBC count, PLT count and their parameters.

Table 1.

Dilution rates used within *Abacus junior vet 5*:

- DIFF dilution   1:160
- Mix dilution   1:160
- RBC dilution   1:32 000
- WBC dilution   1:196 (depends on lyse amount)

Measurement times:

- DIFF measurement   8 seconds
- WBC count   8 seconds
- HGB measurement   3 seconds
- RBC/PLT count   8 seconds

1.4.2   Control Panels

START button

Pressing and releasing the START button triggers an analysis cycle.

Status indicator

A three-color LED is located near the START button.
Its actual color indicates the status of the analyzer.

LED color	Analyzer status
● Green	The analyzer is ready to work. Analysis can be initiated.
● Red blinking	Blood sample can be removed when the LED blinks red 3 times and the instrument beeps 3 times.
● Red	The analyzer is currently performing an analysis. No new measurement can be started.
● Yellow	The analyzer is performing a maintenance process.
● Yellow blinking	The instrument is in stand-by and display light is off.

1.4.3   Display

The display is a 240 x 128 dots, high contrast backlit graphic LCD (Liquid Crystal Display) module.
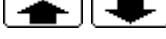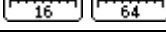
1.4.4 Keyboard

The foil keypad is composed of the following (shown in Section 1.3 - Figure 1):

- **Numeric keys** for entering numerical data, and selecting menu items
- **Function keys** with specific functions. These functions are menu-dependent and are indicated by icons appearing above the keys
- **Hardware function keys (short-cut keys)** for easier navigation between menus
- **Cursor control keys** ↑ and ↓ for moving between database items, ← and →, for moving between parameter columns or menu levels
- **START key** for initiating an analysis cycle
- **OK key** for confirming data
- **Del key** for deleting characters
- **Help key** for HELP function

Function keys

Below is a list of possible icons and functions assigned to the so-called soft-keys (function keys)

Function key	Action triggered
⬚➡	Exit from actual menu or action
✖	Leave data-entry menu without saving any changes made to it (Cancel)
✔	Confirm the results or changes made (OK)
↻	Redo action (e.g. Blank measurement)
⌇	Display histograms of the highlighted patient ID or QC Lot No.
▦	Show data in table format
#9999	Enter/modify sample/patient data
⬆ ⬇	Select between result pages
▤⬆ ▤⬇	PAGE-UP / PAGE-DOWN key in a multi-page menu
⊢16⊣ ⊢64⊣	Change scaling of Levey-Jennings chart (16 or 64 days)
🐾🐈	Patient type selection
⊘	Confirm error
↳▤	Go to local menu (database, measurement)
▲⋮▼	Limits
STOP	Stop a running process

Below we list the icons and functions assigned to so-called hardware function buttons

Function key	Action triggered
ⓘ	Information
◉	Measuring process at once
▣	Database
⬡	Utilities menu
⎙	Printing function
⤶	Exit menu

1.5   Control Material

Abacus junior vet 5 allows continuous monitoring with DiatroCont5 control (control blood). This should be matched to the types of samples usually run on the instrument. Specification for this material (assay values and allowed tolerances along with expiry date) is always enclosed with the approved control material.

1.6   Accessories

Below is a list of accessories shipped with your *Abacus junior vet 5* instrument. This list can also be referred as the "*Abacus junior vet 5 - pack*"

> *Abacus junior vet 5* Hematology Analyzer
>
> *Abacus junior vet 5* User's Manual (this booklet)
>
> *Abacus junior vet 5* Reagent Tubes (with colored connector caps)
>> Diluent tube (green)
>> Lyse tube (yellow)
>> L_VET5 tube (orange yellow)
>> Clean tube (blue)
>> Waste tube (red)
>> Rinse tube (white)
>
> *Abacus junior vet 5* Cleaning Tube Kit.
>
> *Abacus junior vet 5* Caps for reagent containers (matching reagent tube connector cap colors).
>
> *Abacus junior vet 5* Waste Container (20 L).
>
> *Abacus junior vet 5* External power supply and Power cable.
>
> *Abacus junior vet 5* Tube adapters.
>
> *Abacus junior vet 5* Thermal roll-paper.

Reagent Tubing Kit: Cleaning Tube Kit:

1.7 VET5 Specifications

Chambers	25 µl of whole blood in 3-part mode, 50 µl of whole blood in 5-part mode
	50 µl of whole blood in pre-diluted 3-part mode
Chambers	1 unified chamber for diluting whole blood and counting
Reagent system	Isotonic Diluent, Lyse, VET5 Lyse, Cleaner and Rinse
Aperture diameter	80 µm
Throughput	22-28 tests/hour in 3-part mode, 15-20 tests/hour in 5-part mode

Characteristics	Accuracy	Reproducibility (CV)	Correlation coefficient(R)	Carry-over sample to sample	Test range	Unit
WBC	5%	<10%	>0.85	<1%	4.0-20.0	$10^3/\,\mu l$
RBC	5%	<10%	>0.85	<1%	4.0-15.0	$10^6/\,\mu l$
HCT	5%	<10%	>0.85	<1%	25.0-50.0	%
HGB	5%	<10%	>0.85	<1%	6-16	g/dl
PLT	10%	<20%	>0.75	<3%	200-900	$10^3/\,\mu l$
LYM%	20%	<20%	>0.75	N/A	15-50	%
NEU%	20%	<20%	>0.75	N/A	25-80	%
EOS	20%	<20%	>0.75	<0.1	0.5-2.0	$10^3/\mu l$

Sampling method	Open tube system with automatic sample rotor.
Sample types	Dog, Horse, Cow, Cat Calibrator/QC material (5-part mode)
	Ferret, Goat, Guinea Pig, Mouse, Pig, Primate, Rabbit, Rat, Sheep (3-part mode)
Clog prevention	High-voltage pulse on aperture in each analysis cycle, chemical cleaning and high pressure back-flush of the aperture using Cleaner reagent.
Cleaning procedure	High-voltage burst of the aperture, high-pressure back-flush, chemical cleaning of the aperture.
Quality control	6 QC levels, QC parameters include: mean, ± range, SD and CV for all measured and calculated parameters, 16- and 64-day Levey-Jennings charts, separate QC database.
Calibration	3-measurement automatic and manual calibration of WBC, HGB, RBC, PLT, MCV, RDW, MPV and EOS absolute.
	Independent calibration of pre-diluted mode.
Multi-user feature (advanced feature)	3-level multi-user operation with selective privilege levels, user identification with ID and password.
User interface	Easy-to-use, menu driven user interface with 6 software buttons (with icons), 6 hardware function buttons, cursor and numeric keys.
Languages available	English, French, Italian, German, Spanish, Russian, Hungarian.
Data capacity	2000 results, with RBC, PLT, WBC 3-part and EOS histogram (5-part mode).
Host computer interface	USB B port or RS-232.
	USB mass storage device (PenDriveTM)
Data back-up method	Free DiatronLab data management software.
Software upgrade method	via USB A port using USB mass storage device (PenDriveTM).
Printer drivers	Canon BJC, Esc/P, Esc/P2, Esc/P raster, PCL4.
Built-in printer	Seiko „Easy Paper Operation" thermal printer, 56 mm wide roll paper.
Display	240x128-dots, high-contrast, backlit, monochrome (white on blue) graphics LCD (liquid crystal diode).
Keypad	29 foil keys + separate START button.
External keyboard	Standard PS/2 compatible keyboard.
Power requirement	12VDC, 6A, 72W max. operating power.
Power supply unit	External, auto-ranging power unit for 100-120 or 200-240 VAC, 50–60Hz.
Operating temperature	59–86 °F (15–30 °C). Optimal temperature is 77 °F (25 °C).
Dimensions (W x D x H)	12.6 x 10.2 x 14.4 in (320 x 260 x 365 mm).

Net weight   12 kg.

2. INSTALLATION

2.1 General information

This chapter provides instructions for the installation of the *Abacus junior vet 5* hematology analyzer. The procedures described below must be followed correctly to ensure proper operation and service. Please carefully read and follow all instructions in this *User's Manual* before attempting to operate *Abacus junior vet 5.*

Abacus junior vet 5 hematology analyzer is a precision instrument, and must be handled accordingly. Dropping or other improper handling of the instrument will disturb calibrated mechanic and electronic components and/or cause other damage. ***Always handle the instrument with care.***

2.2 Environmental factors

Operate *Abacus junior vet 5* within the ambient temperature range of 15-30°C and relative humidity of 65% ± 20%. The optimum operating temperature is 25°C.

Avoid using the instrument in areas of extreme high or low temperatures or where it is exposed to direct sunlight. If it is kept at a temperature less than 10°C, the instrument should be allowed to sit for an hour at the correct room temperature before use.

Reagents should be stored at a temperature range of 15-30°C.

The instrument should be placed in a well-ventilated location. The instrument should not be placed near potentially interfering devices capable of emitting radio frequencies (e.g. radio or television receiver, radars, centrifuge, X-ray devices, fans, etc.).

Operation at an altitude over 3000 meters (9000 ft) is not recommended.

Instrument is designed to be safe for transient voltages to INSTALLATION CATEGORY II and POLLUTION DEGREE 2.

Environmental and electrical requirements have been provided to insure the accuracy and precision of the instrument and maintain a high level of operational safety for lab personnel.

2.2.1 Electrical requirements

Abacus junior vet 5 comes with a power cord appropriate for your power system. Proper use of the appropriate power cord assures adequate grounding of the system.

WARNING: Failure to proper ground the *Abacus junior vet 5* bypasses important safety features and may result in electrical hazard.

2.2.2   Space requirements

It is important to install the instrument in a suitable location. A poor location can adversely affect its performance. Consider the following space requirements:

- Select a location near a power source and close to a suitable drain.

- Place the unit on a clean and level surface.

- Leave at least 0.5 m space on both sides and above the instrument to access pneumatics and (optional) built in printer. A minimum of 0.2 m must be maintained between the rear panel and the wall to allow for heat dissipation and tube clearance.

- Install the reagents in a suitable place that will make your work easy. The best place is on the ground, below the supporting desk the instrument is placed on. The pneumatics system is capable of aspirating reagents from containers being 1.0 m below the reagent inputs. Make sure the reagent tubes are not bent, broken, twisted or blocked in between the desk the instrument is on and the wall behind. Such circumstances can result in instrument operation failure.

- DO NOT PLACE the reagents above the instrument, as there can be a risk of falling and spilling.

WARNING: Install the unit on a table or workbench. If the unit is installed without a supporting desktop under the unit, there is a possibility that *Abacus junior vet 5* could accidentally fall.

2.2.3   Peripherals

External peripherals should only be connected when both the instrument and the peripheral device are powered off. Possible peripherals are:

- external printer
    - o the printer must be recommended by authorized technician
    - o the printer must be approved and listed
    - o the printer must have a CE mark
- external keyboard
    - o the external keyboard must be approved
    - o the external keyboard must have a PS2 connector, or suitable adapter
- link to host computer via serial or USB port
    - o serial (USB) link cable must be approved by technician

2.2.4   Reagents and waste handling

Reagents should be handled according to national or international regulations.

WARNING!   **Reagents may cause corrosion and skin irritation. If any of the liquids leaked onto the cover of analyzer or the furniture, it has to be wiped off immediately. In case of skin contact, the liquid has to be rinsed off with plenty of water.**

Waste generated by the unit is biohazard material. Handling and disposal must happen according to regulations regarding reagent systems.

WARNING!   **Waste contains poisonous substances (because of chemical content) and human origin substances causing biohazard. These substances are representing potential danger to environment. For this reason, safe handling of the waste liquid is very important.**

2.2.5   Maintenance

The user should check the following components weekly:

- bottom of washing head for salt build up – should be wiped off with a damp cloth
- tubing system – by opening the side and back doors and look for any liquid leakage. If any leakage is observed, authorized technician should be contacted.

Caution:
The following parts must NOT be opened or serviced by the user:
- electrical supply
- electronic boards

2.2.6   Cleaning

The instrument and its power supply should be cleaned on the outside only, using a damp cloth with a soft detergent. DO NOT let liquids get inside the units.

2.2.7   General points

The manufacturer guarantees work safety reliability and general characteristics under the following conditions only:

- services and repairs are performed by an authorized technician
- the electrical system of the laboratory follows national and/or international regulations
- the system is operated according to instructions contained herein

2.3 Unpacking and installation

1. Carefully remove the *Abacus junior vet 5* hematology analyzer from the shipping carton. Inspect the instrument for any visible signs of damage incurred during shipping. Would you find any damage, file a claim with the carrier or your distributor immediately. Check the accessories received against the packing list. Contact Service if anything is missing.

2. **CAUTION!** Prior to initial operation, allow the instrument to reach room temperature (approx. 2 hours). Rapid temperature changes in an operational unit can lead to water condensation, which may damage electronic parts.

3. Place the instrument on a firm work surface in the designated work area, near an appropriate AC electrical outlet. The connection MUST be grounded.

NOTE   **Before making connections**: Make sure that all power is in "OFF" setting before connections (printer, external keyboard) are made. Carefully read all literature accompanying the instrument and its accessories. Pay particular attention to the operating procedures for the external printer.

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4. **Keyboard and external printer**
   Attach the keyboard cable to the round "KEYBOARD" port on the back of the instrument. Attach both ends of the printer cable to the appropriate ports on the printer and *Abacus junior vet 5*. Attach the AC adapter to the printer (if required) and plug it into an AC outlet.

5. **Host Computer**
   The instrument has a built-in serial port that allows connection to a host computer. Results, including histograms, may be exported. Serial (USB) I/O settings can be found in Settings.
   For installation instructions, please contact Service.

6. **Power supply**
   Connect the power supply to the instrument. Attach power cord outlet to the external power supply of *Abacus junior vet 5* and plug the other end into a properly grounded AC outlet.

   Do not switch on the instrument before connecting the external power supply to the instrument and to the AC outlet, as well as before connecting an external printer or a keyboard to the instrument.

7. Reagent Containers

Place the reagent containers near the instrument, to an accessible location. Do not place the containers to a higher position than that of *Abacus junior vet 5*, because would a tube come off its connector, the fluids spoil out. Use the supplied connecting tubes and special bottle caps. Be sure that the color on each tube, cap and connector in the back of the instrument match. You can for example, place the reagent containers below the desk *Abacus junior vet 5* is installed on, as the instrument has sufficient power to draw the liquids from a lower location.

All containers should be left open (do not block the small air vent hole on the special container caps) in order to provide free airflow.

(For connections, see Figure 5.)
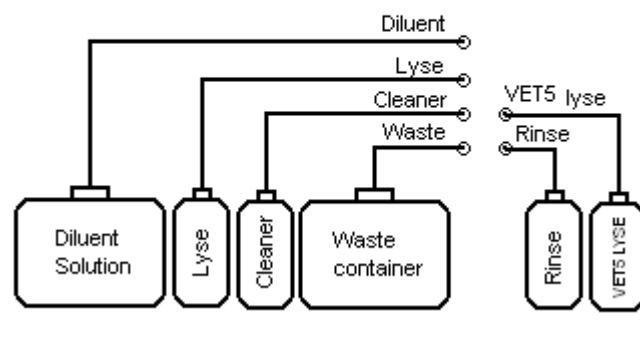
Figure 5. Reagent connections

WARNING! Reagents may cause corrosion and skin irritation. If any of liquids leaked to cover of analyzer or the furniture, it has to be wiped down immediately. In case of skin contact the liquid has to be rinsed by plenty of water.

2.3.1 Turning the Instrument ON

a. In case you use an external printer (for information, read manual shipped with the printer) connect it and turn it on.

b. Turn the *Abacus junior vet 5* on using the power switch on the rear panel. The On position is marked by the **I** symbol.
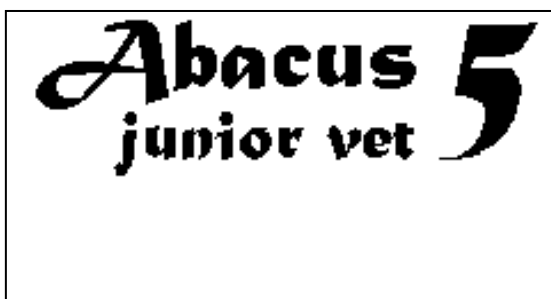
During start-up, the following screen is displayed. The software version number appears few seconds later, when the software starts.

An important feature of the instrument is that when the software version is completed, the DATABASE will be displayed without any pneumatic initialization (default setting). Pneumatic movement will be initiated only when necessary for the relating process.

The default setting can be changed at Service Menu level, in this case the instrument will start with pneumatic initialization giving the possibility to perform a measuring process immediately. Please call the Service Personnel in case you want to change the setting.

PatID	SmpID	Date	
□8313	19	12.06.2007	13:40
□5612	20	12.06.2007	14:06
□3013	21	12.06.2007	14:16
□5630	22	12.06.2007	14:21
□5627	23	12.06.2007	14:32
□5457	24	12.06.2007	14:38

CAUTION!   Wait 5 minutes before initiating any measuring process to allow the instrument to reach the optimal working temperature.

In some cases, a priming cycle is necessary prior to sample introduction. The instrument will perform the cycle automatically if the fluid sensors are on and additional liquid in the tubing system is required. A priming cycle should be run:

- at installation
- in case of extended time out of use
- after replacement of any component related to the Fluidic System
- reagents are replaced with the instrument turned on

2.3.2 Turning the Instrument OFF ⏏

The instrument should never be switched off by simply flipping the power button on the rear panel. Doing so may result in erroneous operation during later use. It can be so, because the instrument uses different kinds of solutions, one of which is the so-called diluent. This liquid is an isotonic saline solution containing salt. Would it not be washed out of special units of the instrument, or would chambers not be filled with this solution may lead to dust condensation or salt build up.
Therefore always follow the instructions below when switching the instrument off.

Press EXIT key ⏏ on the front panel. The following screen is displayed.

⏏ EXIT

SHUT DOWN (1)

```
Exit
 1. Shut down
 2. Preparing for shipment
```
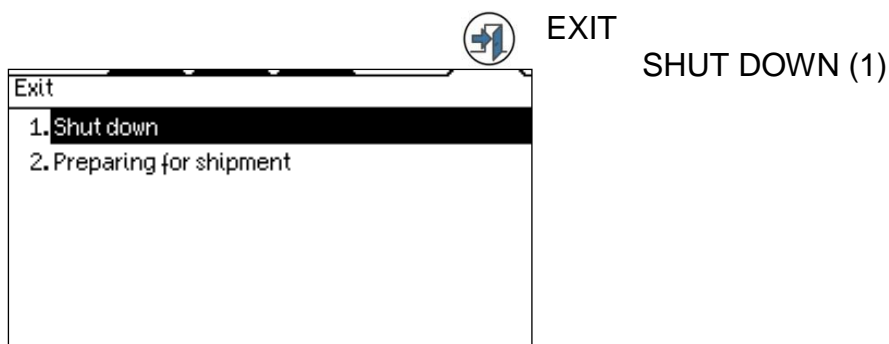
From the Exit menu, select **Shut down**. When prompted, press ✔ to confirm. *Abacus junior vet 5* will display a message and give a tone indicating that it is safe to shut it off.

Turn *Abacus junior vet 5* off using the power switch on the rear panel. The Off position is marked by **O** symbol.

2.3.3   Preparing for shipment

The second item in the shut down menu should be used when the instrument is to be shipped or left unused for a longer time (more than 2 weeks). The instrument will ask you to use the cleaning tube kit and 100ml of distilled water.
Follow the instructions appearing on the display.

EXIT

PREPARING FOR SHIPMENT (2)

! Message 5001/19300

Remove reagent tubing at rear reagent inputs (Diluent, Lyse, Lyse Vet5, Rinse and Cleaner). Leave waste connected.

✔

Here, the user is instructed to remove tubing connectors, so they could be drained.

Leave the waste connector attached.

! Message 5002/19300

Connect min 100 ml distilled water to reagent inputs using cleaning tube kit.

✔

Next, you should connect the cleaning tube kit to the reagent inputs, submerging the free end in a bottle containing at least 100 ml of distilled water.

Cleaning tube kit connected

The analyzer will flush any remaining reagents from the system into the waste container.

! Message 5003/19300

Remove cleaning tube kit. Keep reagent inputs free. Leave waste connected

✔

As a next step, the analyzer asks you to remove the cleaning tube kit.

When finished, the analyzer prompts you to power off the system. Remove the waste connector after shutting down.

2.3.4   Emergency handling

In case of emergency situation - like instrument catching on fire (short-circuit, etc.) - cut off power immediately and use a fire-extinguisher if necessary.

3. MENU SYSTEM

3.1   General Information

This chapter contains information about the structure and usage of the software implemented menu structure.

This integrated software controls instrument operations including calculation and evaluation of measured data, displaying results and information screens storage and recalling of data.

3.1.1 Navigating in the Menu System

The instrument uses a menu system to initiate actions and allow access to settings.

There are four possible ways to navigate between menus and menu items:

The most important issue is that there are 6 function keys above the LCD screen.
You use these buttons to navigate between main functions of the instrument.

These keys are short cut keys: by pressing any of them you can directly access main functions, whichever submenu you are in.
If you use an external keyboard you can access these functions with keys F8 through F12. (described in Menu Structure as well).

active tab   accessible tab   tabs showing the main functions

Measure local menu
1. Repeat last sample
2. Measure blank
☐ 3. Prediluted mode
4. Needle Height Setting – B: 0 mm
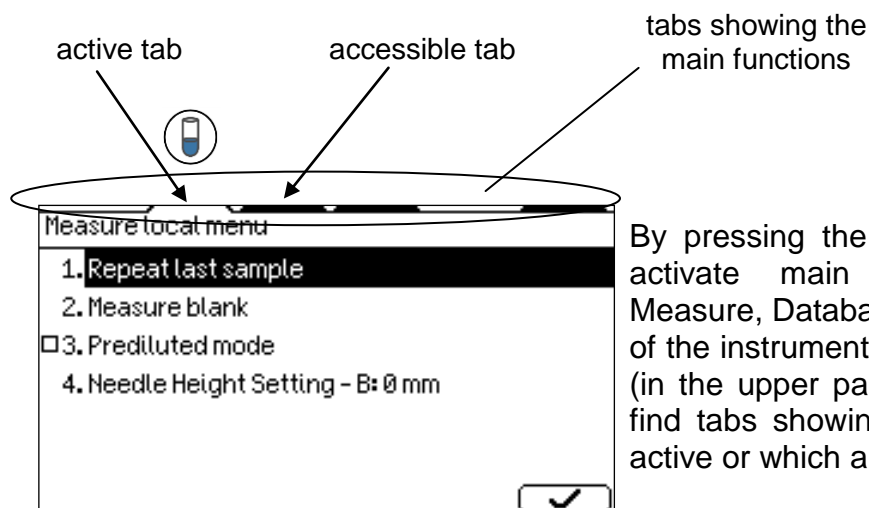
By pressing the short-cut keys, you can activate main functions (Information, Measure, Database, Utilities, Printing, Exit) of the instrument. Below the short-cut keys (in the upper part of the screen) you can find tabs showing which main function is active or which are accessible directly.

a. You can select a menu item (move highlight) with the ↑ ☐and ↓ keys and press the **OK** key to enter or activate the highlighted item. Within a submenu, you can press the ⬅ function key to return to the previous menu level.
This method is suggested while learning instrument operation.

b. Pressing the numeric key corresponding to the desired menu item allows selection and access of an item without the need to additionally press the **OK** key.
Pressing the **0** (zero) key has the same effect as the ⬅ function key.
This method is more efficient when the user knows the menu structure.

c. You can also move between the different menu levels using the ← and → keys. These have the same effect as OK and ⬅, respectively.

If a menu item would open up a submenu, then the item is indicated with a ▶ symbol on the right of the menu line.

Some results can be displayed in table format. The following keys may be used for browsing the database:

3 ⤒   page up
9 ⤓   page down
1 ↑   jump to top of list
7 ↓   jump to bottom of list

Several menus have items with boxes in front of the text. These indicate two-state options. The *selected (active)* state is indicated with a filled box, the *deselected (inactive)* state is indicated with an empty box. Pressing **OK** toggles its state.

Other items have circles in front of the text. These are called "radio-buttons".
They are divided into groups separated by horizontal lines.
The function of these groups is that only one item of the group can be selected, and this is indicated with a filled circle in front of the selected item. Selecting an item of the group will move the filled circle in front of this item, emptying the circle of the old selected item.

3.1.2 Menu structure

The following outlines the Abacus junior vet 5's menu functions.

(i) Information/Help   Displays help for the current screen

(📋) **Analysis/Measurement**

1 – Repeat last sample   Repeats last sample tested (VET5 assigns new sample ID, all other patient information is unchanged)

2 – Measure blank   Performs blank measurement.

3 – Prediluted mode   Enters automatic calculation for 1:5 externally diluted sample ("1:5" appears in upper left corner of the screen).

4 – Needle Height Setting - D: xxmm   Adjusts sampling depth, if needed

#9999

Sample ID   Vet5 assigns it automatically
Patient ID
Species
Doctor
Name
Birth
Sex

Displays reference ranges for selected species (can be modified)

Database

1 – Go to specified record — Selects one record by time/date, Sample ID, and/or Patient ID (more criteria narrows search).

2 – Selection

    1 – Select by date, time and ID — Selects one or more records by range of times/dates, sample IDs,

    2 – Select all — Selects all records.

    3 – Deselect all — Deselects all records.

3 – Change sort order

    1 – Unsorted — List records in the order entered (most recent to oldest).

    2 – Sort by time — Lists records by measurement time (oldest to most recent).

    3 – Sort by sample ID — Lists records by sample ID (highest to lowest).

    4 – Sort by patient ID — Lists records by patient ID (highest to lowest).

4 – Manage selected records

    1 – Send selected records — Sends selected records to a computer through a serial connection.

    2 – Delete selected records — Deletes selected records from the VET5 database.

    3 – Backup selected records — Saves selected records to USB drive.

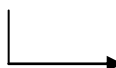5 – View external — Reads stored records from USB drive

6 – Backup one day — Backs up all results from specified date to USB drive (insert USB drive

Toggle between graph and table display of selected results.

Opens dialog for viewing/modifying patient information (sample ID and patient type cannot be changed).

#9999

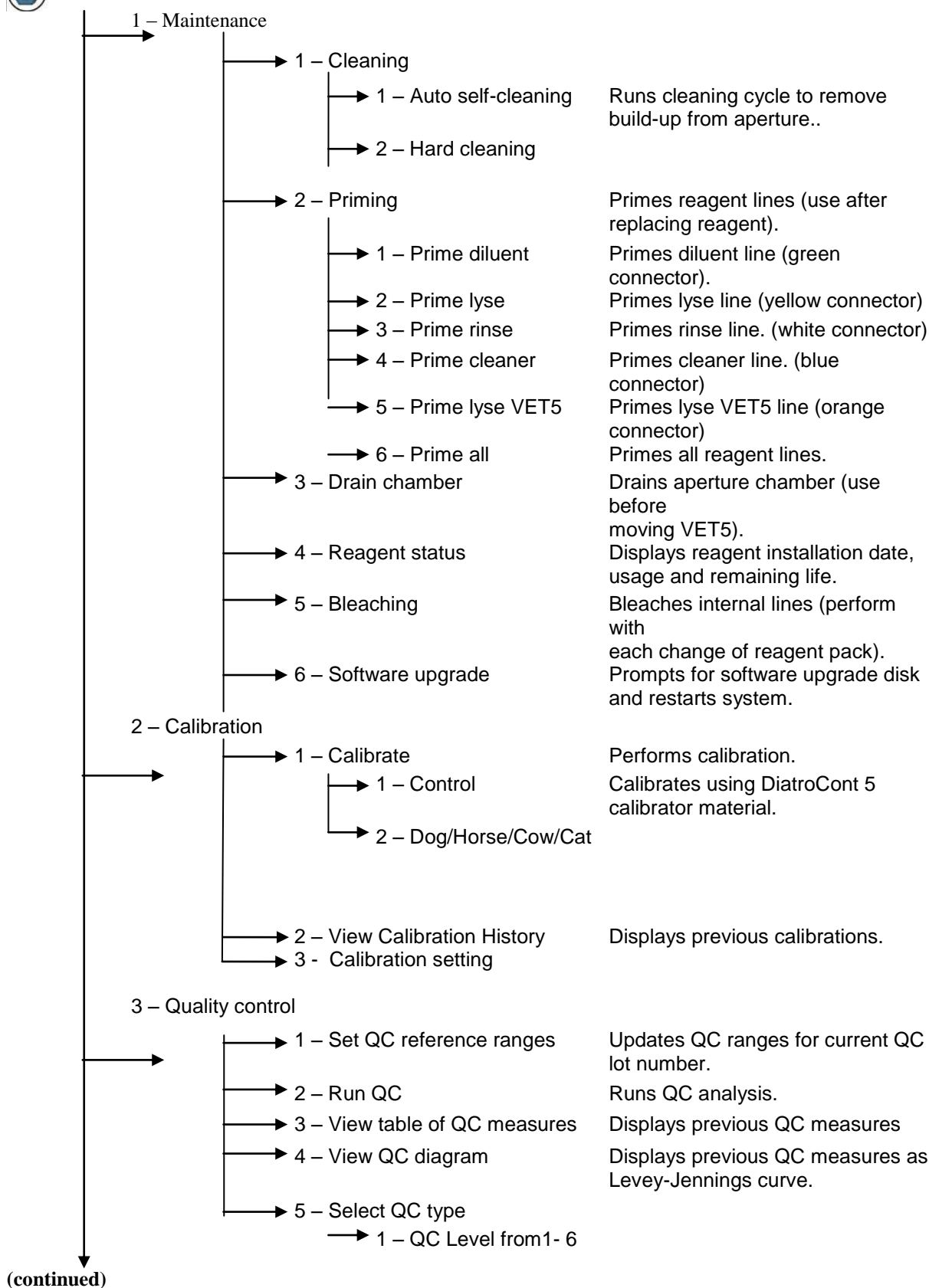|	
Sample ID	Name
Patient ID	Birth
Species	Sex
Doctor	

Utilities

```
1 – Maintenance
        1 – Cleaning
                1 – Auto self-cleaning    Runs cleaning cycle to remove
                                          build-up from aperture..
                2 – Hard cleaning

        2 – Priming                       Primes reagent lines (use after
                                          replacing reagent).
                1 – Prime diluent         Primes diluent line (green
                                          connector).
                2 – Prime lyse            Primes lyse line (yellow connector)
                3 – Prime rinse           Primes rinse line. (white connector)
                4 – Prime cleaner         Primes cleaner line. (blue
                                          connector)
                5 – Prime lyse VET5       Primes lyse VET5 line (orange
                                          connector)
                6 – Prime all             Primes all reagent lines.
        3 – Drain chamber                 Drains aperture chamber (use
                                          before
                                          moving VET5).
        4 – Reagent status                Displays reagent installation date,
                                          usage and remaining life.
        5 – Bleaching                     Bleaches internal lines (perform
                                          with
                                          each change of reagent pack).
        6 – Software upgrade              Prompts for software upgrade disk
                                          and restarts system.
2 – Calibration
        1 – Calibrate                     Performs calibration.
                1 – Control               Calibrates using DiatroCont 5
                                          calibrator material.
                2 – Dog/Horse/Cow/Cat

        2 – View Calibration History      Displays previous calibrations.
        3 - Calibration setting
3 – Quality control
        1 – Set QC reference ranges       Updates QC ranges for current QC
                                          lot number.
        2 – Run QC                        Runs QC analysis.
        3 – View table of QC measures     Displays previous QC measures
        4 – View QC diagram               Displays previous QC measures as
                                          Levey-Jennings curve.
        5 – Select QC type
                1 – QC Level from1- 6
```

(continued)

30

Utilities

4 – Diagnostics

1 – Device information — Shows model, S/N, software version.

2 – Statistics — Displays operation statistics.

3 – Self-test — Tests the VET5's internal systems.

5 – Settings

1 – Printer settings — Dialog for viewing/modifying printer settings.

2 – Customize

1 – General Settings — Dialog for setting screen saver delay, VetScan date format, and printing combined VetScan/VET5 results

2 – Units — Dialog for setting unit preferences.

3 – Laboratory — Dialog for laboratory information (used in report header).

4 – User modes — Selects single- or multi-user mode.

1 – Single user mode

2 – Multi user mode — Each user has unique user name (ID) and password.

3 – Date and time — Dialog for setting date/time & format.

4 – Fluid sensors — Enables and disables reagent sensors.

1 – Diluent & Cleaner

2 – Lyse

3 – Lyse VET5

4 – Rinse

5 – Calibrate sensors — Calibrates reagent sensors (use if unit incorrectly reports missing reagents).

6 – Service — Displays contact information for technical service.

Printer

Prints selected test results.

32

Exit

    → 1 – Shut down

Shuts off the VET5 (use if the unit will not be used for over 72 hours).

    → 2 – Preparing for shipment

Drains and shuts off the VET5 (use if the unit will be unused for more than 2 weeks, or if it will be shipped).

4. OPERATING PRINCIPLES

4.1   Impedance Method

The impedance method (a.k.a. Coulter method) counts and sizes cells by detecting and measuring changes in electrical impedance when a particle in a conductive liquid passes through a small aperture.

Internal electrode
Aperture
Blood cell suspension
External electrode
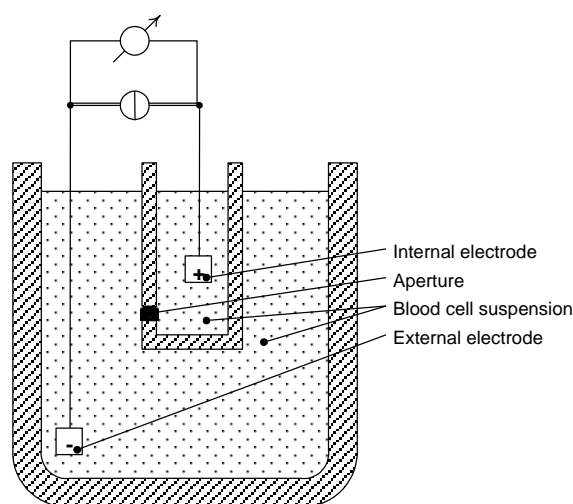
Figure 7. Impedance method

Each cell passing through the aperture – there is a constant DC current flowing between the external and internal electrodes – causes some change in the impedance of the conductive blood cell suspension.
These changes are recorded as increases in the voltage between the electrodes.
The number of pulses is proportional to the number of particles. The intensity of each pulse is proportional to the volume of that particle. The volume distribution of the cells are displayed on diagrams: WBC (EOS), RBC, and PLT histograms.

4.2   Principle of HGB Measurement

The lysed 1:196 sample dilution can be measured by a cyanmethemoglobin method.
The reagent lyses the red blood cells, which release hemoglobin.
Hemoglobin iron is converted from the ferrous (Fe^{2+}) to the ferric (Fe^{3+}) state to form methemoglobin, which combines with potassium cyanide (KCN) to produce the stable cyanmethemoglobin, or hemoglobincyanide. Subsequently, the HGB concentration is measured photometrically.
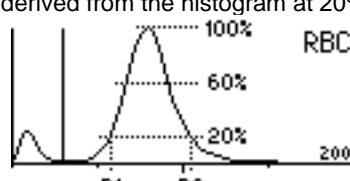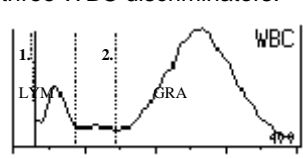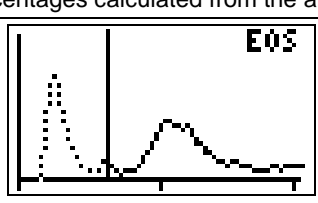
Note: **The above-mentioned measuring method is used to determine the HGB concentration. The HGB concentration can be measured using cyan-free lysing reagents as well. In this case the effect is the same but the used lyse is environmental-friendly reagent.**

4.3 Parameters

Abacus junior vet 5 measures and calculates 22 parameters, listed below. For each parameter we list the name, abbreviation and measurement unit in the first column. Short description for each parameter is in the second column.

White Blood Cells – **WBC** (cells/l, cells/µl)	Number of leukocytes WBC = WBC$_{cal}$ x (cells/l, cells/µl)
Red Blood Cells – **RBC** (cells/l, cells/µl)	Number of erythrocytes RBC = RBC$_{cal}$ x (cells/l, cells/µl)
Hemoglobin concentration - **HGB** (g/dl, g/l, mmol/l)	Measured photometrically at 540 nm; in each cycle blank measurement is performed on diluent HGB = HGB$_{cal}$ x (HGB$_{measured}$ – HGB$_{blank}$)
Mean Corpuscular Volume - **MCV** (fl)	Average volume of individual erythrocytes derived from the RBC histogram.
Hematocrit – **HCT** (percentage, absolute)	Calculated from the RBC and MCV values. HCT$_{percentage}$ = RBC x MCV x 100 HCT$_{absolute}$ = RBC x MCV
Mean Corpuscular Hemoglobin – **MCH** (pg, fmol)	Average hemoglobin content of erythrocytes, calculated from RBC and HGB values. MCH = HGB / RBC
Mean Corpuscular Hemoglobin Concentration – **MCHC** (g/dl, g/l, mmol/l)	Calculated from the HGB and HCT values. MCHC = HGB / HCT$_{absolute}$ Unit of measurement is displayed according to the one chosen for HGB result (g/dl, g/l or mmol/l)
Red Cell Distribution Width – **RDW-SD** (fl) Platelet Distribution Width – **PDW-SD** (fl) Red cell Distribution Width – **RDW-CV** (absolute) Platelet Distribution Width – **PDW-CV** (absolute)	The distribution width of the erythrocyte or platelet population derived from the histogram at 20% of peak xDW-SD = RDW$_{cal}$ x (P2 - P1) (fl), xDW-CV = RDW$_{cal}$ x 0.56 x (P2 - P1) / (P2 + P1) by the factor of 0.56 CV is corrected to the 60% cut
Platelet – **PLT** (cells/l, cells/µl)	Number of thrombocytes (platelets) PLT = PLT$_{cal}$ x (cells/l, cells/µl)
Mean Platelet Volume – **MPV** (fl)	Average volume of individual platelets derived from the PLT histogram
Thrombocrit – **PCT** (percentage, absolute)	Calculated from the PLT and MPV values PCT$_{percentage}$ = PLT x MPV x 100 PCT$_{absolute}$ = PLT x MPV
White blood cell differential: **LYM, LY%** : lymphocytes **MID, MID%** : monocytes and some eosinophils **GRA, GR%** : neutrophil, eosinophil and basophil granulocytes	Absolute values counted in the channels determined by the three WBC discriminators: Percentages calculated from the absolute WBC value.
Eosinophil – **EOS, EOS%** **EOS** shown by the second peak on the histogram	

4.4 Absolute and Linearity Ranges of Measured Parameters

The instrument is guaranteed to provide specified accuracy within its linearity range.

Beyond this linearity range, the instrument is able to display results, but may not guarantee accuracy characteristics.

If the value is over the maximum range of guaranteed linearity, the instrument cannot measure it and the result will be marked with an E (Error) flag.

To measure a sample, whose parameters exceed the maximum value indicated in the table below, pre-dilution is recommended. See section 5.3.1.3 of this manual.

The linearity ranges of primary parameters in normal measuring mode:

Parameter	Linearity Ranges	Maximum	Unit
WBC	0...100	150	10^9 cells/liter
RBC	0...15	20	10^{12} cells/liter
PLT	0...700	1000	10^9 cells/liter
HGB	0...250	400	g/l
HCT	0...100	-	%
MCV	30...150	-	Fl
MPV	3...30	-	Fl

Table 2. Linearity ranges of parameters

The linearity ranges for 1:5 pre-dilution mode:

Parameter	Linearity Ranges	Maximum	Unit
WBC	2…200	300	10^9 cells/liter
RBC	1…30	40	10^{12} cells/liter
PLT	100…2000	3000	10^9 cells/liter

Table 3. Linearity ranges of Pre-dilution mode

5. ROUTINE UTILIZATION and MEASURE

5.1   Sample handling

Since some time will usually elapse between collection of samples and counting, it is necessary to preserve the sample with an anti-coagulant to prevent large groups of cells forming into clots or lumps of cell matter that will clog the cell counter. Choice of anti-coagulant is very important, as some anticoagulants will affect the shape and size of blood cells. In general **EDTA**, preferably potassium based, is the only anti-coagulant recommended for use with electronic blood counters.

Care must be taken when using homemade containers pre-dosed with EDTA. If the container is not filled with enough blood, the ratio of EDTA to blood may reach a level, which results in osmotic transfer from the RBCs which shrinks them. **The ratio of EDTA to blood should not exceed 3 mg/ml**. Generally, we suggest using pre-manufactured sample tubes containing the necessary amount of EDTA. Also, when taking blood, please make sure that requirements attached to sample tubes are met.

Important! **Sample tubes must be filled to at least 7-8 mm height with blood otherwise correct sampling is not guaranteed!**

There is another possibility that can help the user in correct sampling by using the needle setting function. This is available in Measurement Local menu, and controls sampling height of the needle inside the sample tube. So, if you have a sample tube with a higher/lower bottom, you can control the sampling height adjusting this option. Needle offset is displayed in the lower left corner of the measurement screen.

Attention! If you hurt yourself during analysis, biohazard substances can cause infection! Always use rubber gloves!

To initiate analysis:

1. *Invert the closed sample tube 11 times to achieve a homogenous sample.*
   Do not shake the sample, because micro-bubbles can form inside which may cause erroneous sampling!

   You have the possibility to use 3 different interchangeable adapters for different tube types. Tube types are shown in the next figures.
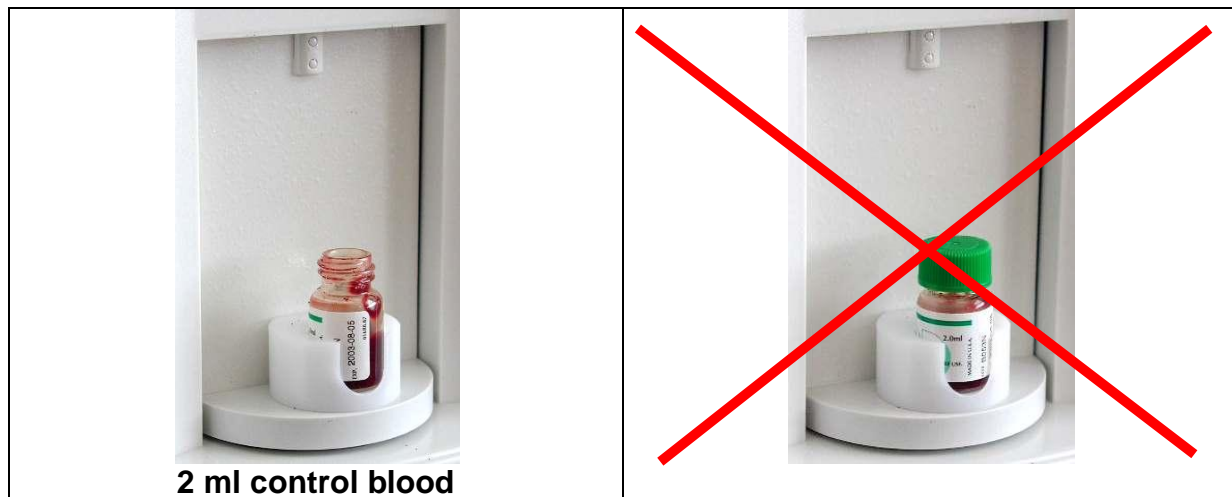
Vacutainer with sample blood	**Sample tube with 5 ml control blood** Please wipe the mouth of the tube because the bursting bubble can dirty the instrument with blood which can cause measurement error at next sample
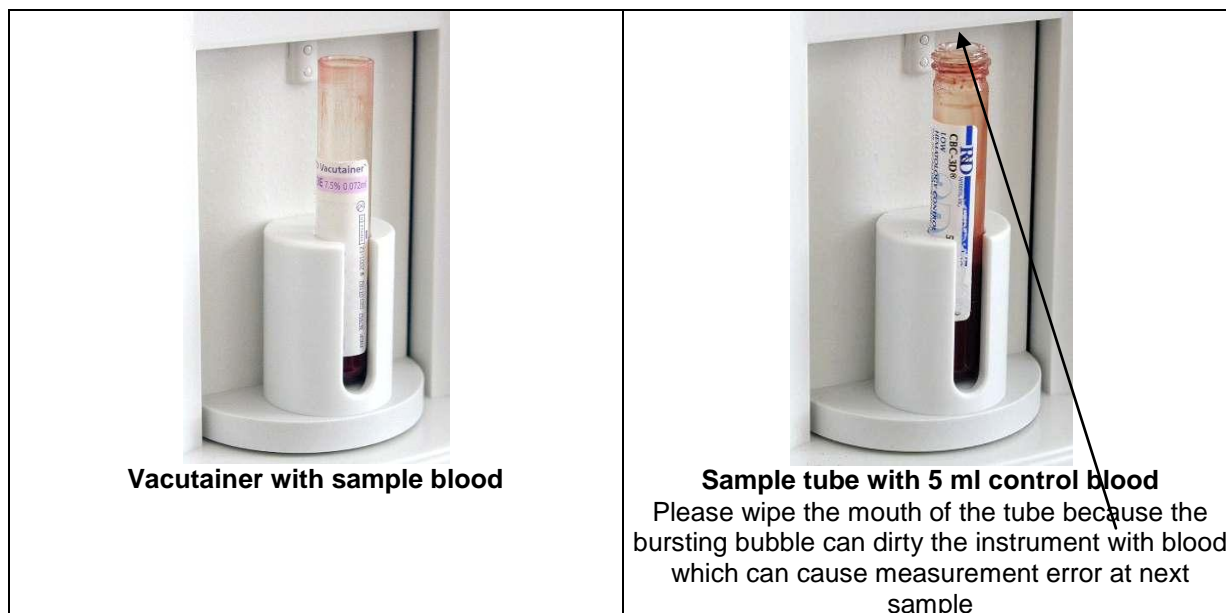
Figure 8. Tubes used in big adapter

Below you can see 3 types of tubes (microtainers) used in micro adapters. These are only examples given by us, you can try to use other type of microtainers as well.

		Be careful to place the tube with the cap always in the position shown above
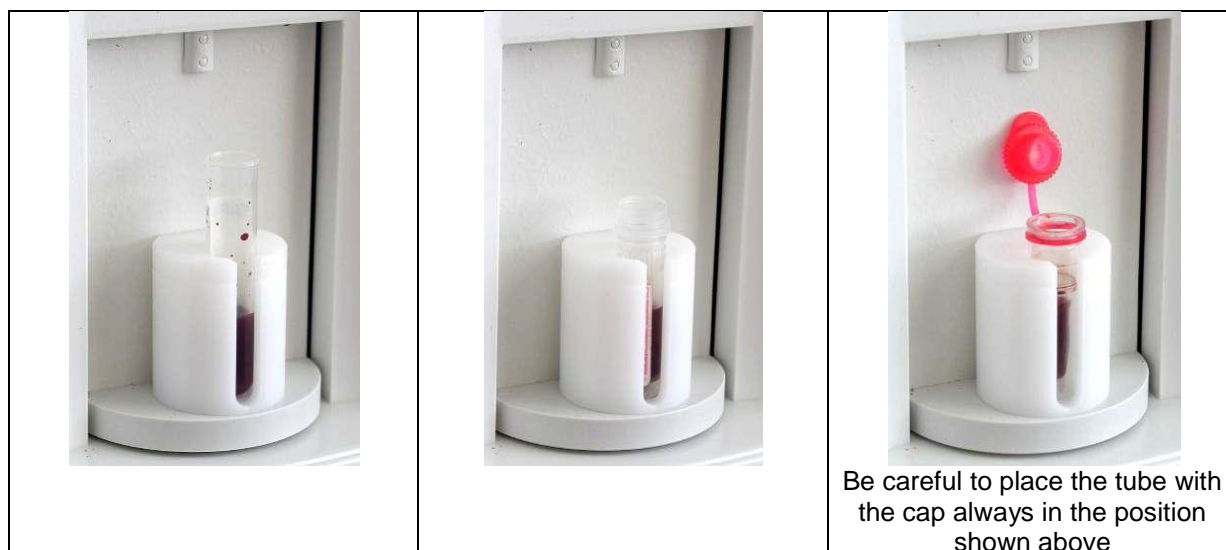
Figure 9. Tubes used in micro adapter

2 ml control blood

Figure 10. Tube used in small adapter

---

1. Remove the cap!! It is very important because the tip will not pierce the cap!

    2. Position the sample tube in the sample rotor.

    3. Push START key.

The sample rotor will turn into inside of the instrument and the needle draws sample from the tube. The aspirating needle is retracted, while its outer surface is automatically rinsed with diluent. This insures a low carry-over between samples. After a few seconds the rotor turns out. Now you can remove the sample tube from the adapter of the sample rotor.

5.2   Sample analysis

5.2.1 Sample preparation

Use K-EDTA anti-coagulated fresh whole blood as sample. **Prior** to sampling, mix the sample gently by **inverting it 11 times**. **Do not shake** as this could damage the blood cells.

5.2.2 Modifying lyse quantity

The default lyse quantity can be adjusted by pressing [▲•▼] on the MEASURE screen. Another option is to modify the lyse quantity by ± **0.1 ml or ± 0.2 ml** is available during analysis.

Press ↑ to **increase** the lyse quantity **(+0.1/0.2 ml)** if the separation between lysed RBCs and WBC populations is poorly differentiated, resulting in increased WBC and LYM counts.

Press ↓ to **decrease** the lyse amount **(-0.1/0.2 ml)** if the WBC histogram seems to be shrunk to the left, i.e. the different WBC populations are overlapped. This can inhibit proper separation of WBC populations.

```
Patient limits
Dog
Lyse        0.65 ml    WBC method    A
ReLyse      0.00 ml    RBC method    A
Lyse V      3.50 ml
Discr        80 fl
  WBC      6.00 - 17.0  10^9/l
      (≡▼)              ( ✗ )( ✓ )
```

The two important parameters influencing lysing are lysing time and lyse quantity.
You cannot change the lysing time, as it is adjusted to the lysing reagent supplied by Diatron.

Above you could read that the lyse quantity can be adjusted either at patient limits, or right before measurement.
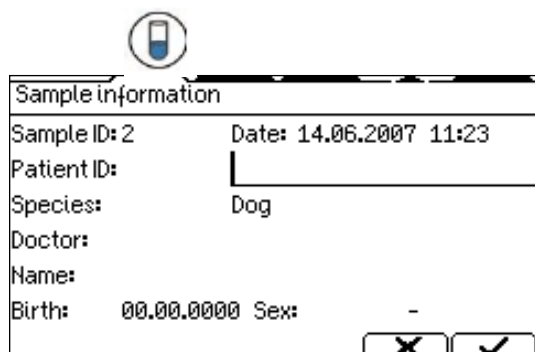
5.2.3 Sample information

The software allows the user to enter information for each sample that has been, or will be measured. If an external PC keyboard (PS2) is used, it must be connected to the instrument **before** turning the instrument on.
Two options exist for sample information entry:

- immediately before analysis
- in the Database menu

To enter sample information prior to sample analysis, press the Measurement/ Anlysis key, and press [#9999] button on the screen. The following screen appears:

Use the keypad OK key and the $\triangleleft$ and $\triangleright$ keys to move through the settings.

Use the $\triangle$ and ∇ keys to change the settings, and the keypad or external keyboard to enter text or numbers.

Press the [✔] to accept data, cancel with [✗] button.

Begin analysis by pressing the Start button.
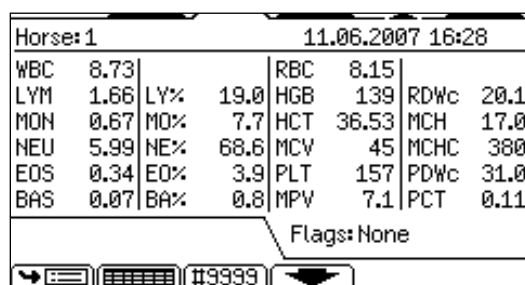
WARNING! Do not reach inside the instrument, as the needle can injure you!

5.2.4 Results

When analysis is complete, the following screen is displayed, including all measured and calculated parameters as well as the WBC, RBC, PLT and VET5 histograms.
Results and histograms will be stored automatically in the memory.

Use [⬆] and [⬇] keys on the screen to move through the results and histograms.

The following table summarizes **warning flags** and give an explanation of their possible cause and a few hints to overcome the problem:

Uppercase letters refer to WBC or HGB problems:

Flag	Meaning	Recommended user action
E	No WBC 3-part differential	Possible lyse problem. May occur in pathological lymphocytosis.
H	HGB blank is high, or no HGB blank	Repeat the blank measurement. If HGB blank is not stable there are probably bubbles in the WBC chamber: Run a cleaning and try blank again. Close the side door if open during measurement.
B	WBC blank is high, or no WBC blank	Repeat the blank measurement, or run prime lyse and try blank again. Possible lyse contamination, or noise problem.
C, Q	WBC clogging	Aperture clogging. Perform cleaning and repeat the measurement. If it is a general problem, please contact your Service Personnel. Low temperature reagents can cause it as well (mainly diluent), in this case you will have to wait until they reach room temperature.

Table 4. Summary of warning flags related to WBC/HGB

Warning flags in lowercase refer to RBC or PLT problems:

Flag	Meaning	Recommended user action
p	PLT blank is high, or no PLT blank	Run cleaning and repeat the blank measurement. Diluent or system cleanliness problem. If it is stable high, replace the diluent by opening a new tank.
b	RBC blank is high, or no RBC blank	Same action as in case of warning flag **p**.
c	RBC/PLT clogging	The same action as in case of the **C** warning flag.

Table 5. Summary of warning flags related to EOS problems:

Result Warning Flags		
Flag	Meaning	Description
X	**EOS Blank high**	Similar to the WBC B flag. Run a cleaning cycle and rerun blank.
Y	**Clogging**	The Lyse2 measurement has encountered a clogging in the aperture. Run a cleaning cycle and repeat sample measurement
Z	**Noise in the EOS Channel**	Possible lysing problem. Check if there is enough reagent in the container. Prime the Lyse2 reagent.

Warning flags can be grouped according to measurement conditions and according to the problems relating to the blood sample.

Measurement conditions: when the flags are related to clogging (**c, y, C**), probably hemolysing problems (**E, b, B, p, z**) and pressure problems (Fatal pressure error). In this case we suggest repeating the measurement.

The asterisk flag (*) near a parameter shows some doubt suspected during the evaluation of that parameter. The reasons can be: a high PLT blank (PLT value will be marked), a case of indefinite discriminator setting (default location is used for some reasons, related parameters will be marked), etc.

Another flagging method is evaluation against the normal ranges. If some of the parameters is out of range it gets a (**-**) flag if under the range, or gets (**+**) if over the range. (And the given parameter will be highlighted as well.) You can customize ranges for all kind of patients by setting the corresponding lower and upper ranges. If you set 0 for a range limit, it will be not verified.

5.3 Measure
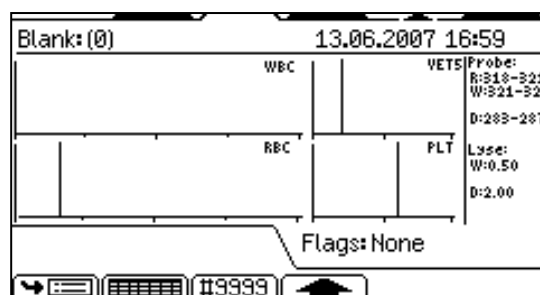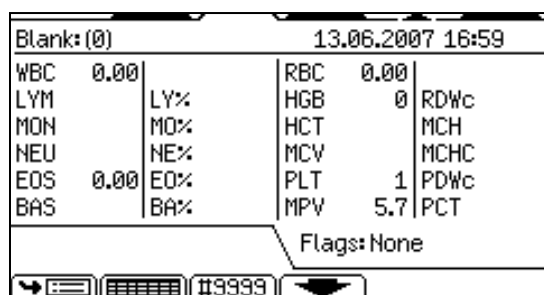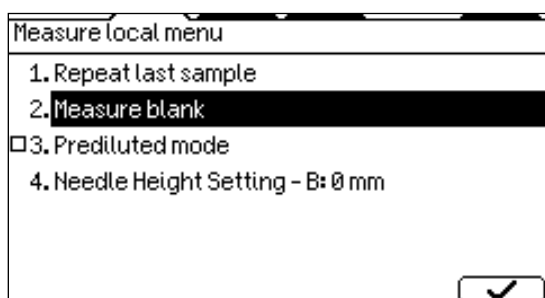
5.3.1 Measure local menu

5.3.2 Blank Measurement

Blank measurement is used for checking the cleanliness of the system and the reagents.

Blank measurement must be performed:

- Once daily, before sample analysis (this is done automatically before the first analysis in MEASURE function).
- After any reagent change (activated manually from the MEASURE/ MEASURE BLANK menu).
- After the replacement of any hardware component that is closely related to the measuring process (aspiration, dilution, counting, rinsing).

Press the Measure key and press the ⬐☰ button on the screen and select Measure blank.


```
Measure local menu
  1. Repeat last sample
  2. Measure blank
□ 3. Prediluted mode
  4. Needle Height Setting – B: 0 mm

                              [ ✓ ]
```



```
Blank: (0)              13.06.2007 16:59
WBC   0.00|        RBC   0.00|
LYM       |LY%     HGB      0|RDWc
MON       |MO%     HCT       |MCH
NEU       |NE%     MCV       |MCHC
EOS   0.00|EO%     PLT      1|PDWc
BAS       |BA%     MPV    5.7|PCT
                        \ Flags: None
[⬐☰][▦▦▦][#9999][ ⬇ ]
```



```
Blank: (0)              13.06.2007 16:59
              WBC          VETS|Probe:
                              |R:318-321
                              |W:321-324
                              |D:283-287
              RBC          PLT |Lyse:
                              |W:0.50
                              |D:2.00
                        \ Flags: None
[⬐☰][▦▦▦][#9999][ ⬆ ]
```

When the Blank measurement is OK, press [✓] to accept the result. The ***Abacus junior vet 5*** is then ready for analysis.

The instrument then displays a sample measurement screen, as shown, and is now ready to perform an analysis.

There are 3 regions for blank value handling:
1. *Optimal* - all results are within acceptable ranges.
2. *Blank is high* - * flag is displayed at relevant results.
3. *Blank exceeds acceptability* - no results displayed.

Parameter	1. No flag at parameter	2. * flag at result	3. E (error) flag at result
HGB	0-10 g/l	10 - 25 g/l	> 25 g/l
WBC	0 - 0.5 x10^3 cells/µl	0.5 - 1.0 x10^3 cells/µl	> 1.0 x10^3 cells/µl
PLT	0 - 25 x10^3 cells/µl	25 - 50 x10^3 cells/µl	> 50 x10^3 cells/µl
RBC	0 - 0.05 x10^6 cells/µl	0.05 - 0.5 x10^6 cells/µl	> 0.5 x10^6 cells/µl
EOS	0-0.1 x10^3 cells/µl	0.1-0.2 x10^3 cells/µl	>0.2 x10^3 cells/µl

Table 6. Blank measurement ranges

Accepted blank values are essential for proper calibration and quality control measurement. For this reason, no calibration or QC measurement can be performed without accepted blank values.

Quality control measurement and calibration can be performed **only** if all blank values are in the first region (receiving no flags or errors).

If analysis errors occur or the blank measurement is too high, an E error flag appears along with the affected parameter and "---" is displayed instead of results. In this situation perform a cleaning.

5.3.3   Using Pre-diluted Mode

Perform an external pre-dilution of the sample using *Abacus junior vet 5* reagent diluent, or an isotonic saline solution. Dilute the sample to 1:5 ratio (1 part sample to 5 part diluent). Mix it well.

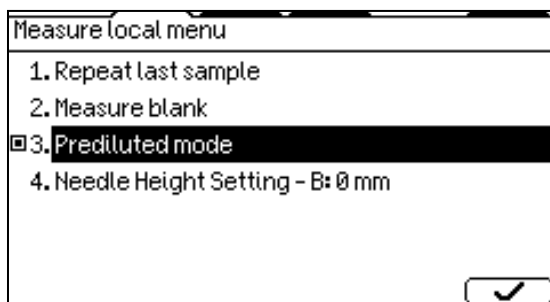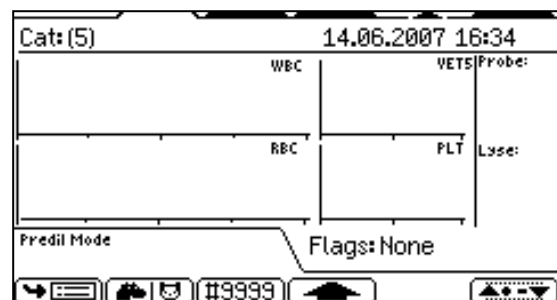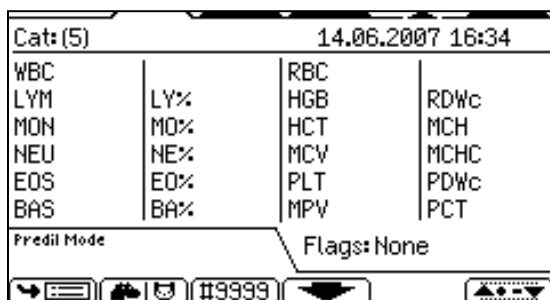To perform the analysis:

1. Press the Measurement/Analysis key 🔘 then press the ⬐▤ soft key.
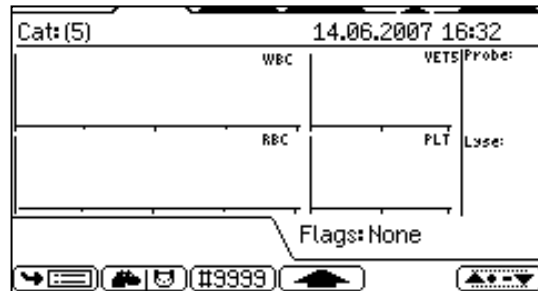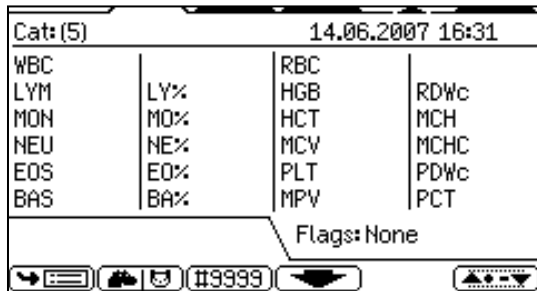
2. Select **Prediluted Mode**

3. Press ☑ soft key. Notice that **Predil mode** now appears in lower left corner.

4. If you are processing a new sample. Press the $\boxed{\text{#9999}}$ soft key and enter the patient information, then press $\boxed{\checkmark}$.

```
Sample information
Sample ID: 5          Date: 14.06.2007  16:34
Patient ID:
                      _____
Species:              Cat
Doctor:
Name:
Birth:     00.00.0000 Sex:          -
                              [  X  ][  ✓  ]
```
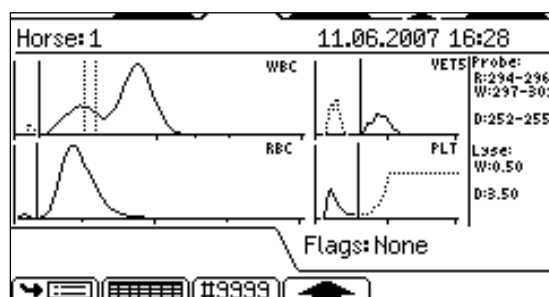
5. If you are processing a sample that has already been tested as non-prediluted: select **Repeat Last Sample** to avoid having to re-enter patient information.

```
Measure local menu
   1. Repeat last sample
   2. Measure blank
□ 3. Prediluted mode
   4. Needle Height Setting – B: 0 mm


                              [  ✓  ]
```

6. Press Start button to begin the analysis. *Abacus junior vet 5* will automatically calculate the results with the 1:5 pre-dilution factor.

```
Horse: 1                     11.06.2007 16:28
WBC   8.73| Predil Mode | RBC   8.15|
LYM   1.66|LY%    19.0|HGB    139|RDWc  20.1
MON   0.67|MO%     7.7|HCT  36.53|MCH   17.0
NEU   5.99|NE%    68.6|MCV     45|MCHC   380
EOS   0.34|EO%     3.9|PLT    157|PDWc  31.0
BAS   0.07|BA%     0.8|MPV    7.1|PCT   0.11
                         \ Flags: None
[↵▭][▦▦▦][#9999][  ▼  ]
```

```
Horse: 1                     11.06.2007 16:28
                       WBC        VETS|Probe:
                                       R:294-296
                                       W:297-302

                                       D:252-255
              RBC           PLT  Lyse:
                                       W:0.50
                                       D:3.50
                         \ Flags: None
[↵▭][▦▦▦][#9999][  ▲  ]
```

6. DATABASE

Patient results are stored in the memory in chronological order, and can be retrieved at any time. Memorizing capacity is 2,000 measurements, including the complete parameter list, histograms, flags, sample data, and date/time of measurements. If memory is full, latest (actual) record will overwrite oldest record.

To access the Database table, press the Database key on the front panel. The first screen that appears shows the most recent saved tests.

PatID	SmpID	Date	
□8313	19	12.06.2007	13:40
□5612	20	12.06.2007	14:06
□3013	21	12.06.2007	14:16
□5630	22	12.06.2007	14:21
□5627	23	12.06.2007	14:32
□5457	24	12.06.2007	14:38

DATABASE

Pressing the ← or → key accesses the remaining, non-visible parameter results. The ↑ or ↓ key scrolls between the results individually.

To display the WBC, RBC, PLT and VET5 histograms, press the ⎍ soft key.

To print an individual result, highlight the result and press Print .

Database local menu
1. Go to specified record
2. Selection ▶
3. Change sort order ▶
4. Manage selected records ▶
5. View external
6. Backup one day

<DATABASE LOCAL MENU>

From the database table screen, enter the Database local menu by pressing the **Menu** key.

The menu contains the following items:

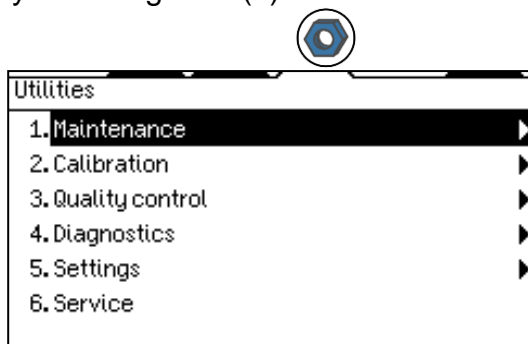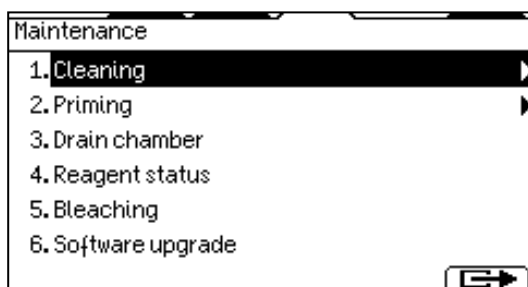| Command	Function
Go to specified record	Jumps to a particular sample record. Enter the date and time, sample ID, and patient ID of the sample you want to view, and press ✔. The first sample meeting your parameters is then displayed. If you leave any ID blank (0), records are searched by date/time only
Selection	**Selects all** sample records in memory, or all having a specific date, time and ID. **Select by date, time and ID** allows you to select a range of specific records, and **Deselects all** deselects all records. Entering 0 as an ID searcehs by date/time only. Corresponding results are marked with a filled box.
Change sort order	Changes the order in which results are displayed: by time, sample ID or patient ID.
Manage selected records	**Sends selected** records to a PC, deletes them, or saves them to a diskette or USB device. Before **selecting Backup selected** records, insert a 3.5 inch diskette or connect a USB storage device. An empty floppy diskette can store data for 800 samples.
View external	Views previously saved data from a diskette or USB storage device.
Backup one day	Backs up all records from a specified day to a diskette or USB storage device. Select a day to backup, then press ✔ to confirm.

7. UTILITIES

7.1 Maintenance

By selecting item (1) of the UTILITIES you can access the MAINTENANCE menu.


```
Utilities
1. Maintenance          ▶
2. Calibration          ▶
3. Quality control      ▶
4. Diagnostics          ▶
5. Settings             ▶
6. Service
```

7.1.1 Regular Maintenance Jobs

From Maintenance submenu, the user can initiate maintenance procedures such as cleaning, priming, draining chamber, reagent status or bleaching.

```
Maintenance
1. Cleaning             ▶
2. Priming              ▶
3. Drain chamber
4. Reagent status
5. Bleaching
6. Software upgrade
                    ⬛▶
```

MAINTENANCE (1)

Select the required submenu.

7.1.1.1 Cleaning

Item 1 in the above menu brings up cleaning functions.

```
Cleaning
1. Automatic self-cleaning
2. Hard Cleaning


                    ⬛▶
```
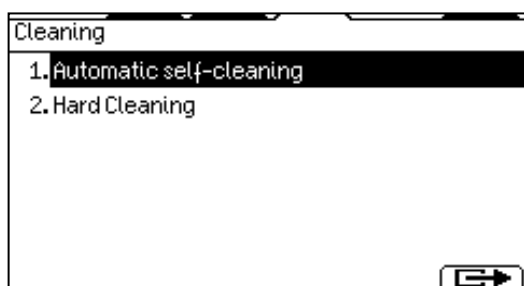
Item 1 starts a washing cycle using the system cleaner reagent. This action is recommended if clogging problems are experienced (C or Q error flag).
Item 2 initiates a process that uses a light solution of hypochlorite (NaOCL), and washes the entire system with it. The instrument will ask for the cleaning solution in a sampling tube.

7.1.1.2   Priming

```
Priming
  1. Prime diluent
  2. Prime lyse
  3. Prime rinse
  4. Prime cleaner
  5. Prime lyse VET5
  6. Prime all
```
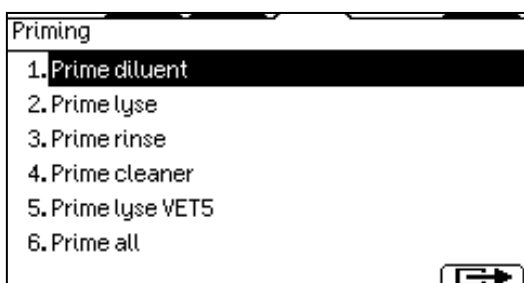
During the priming cycle, the fluidic system is rinsed with a large amount of diluent. It differs from the process in a start-up procedure; as in the latter case a simple filling up of the fluidics is performed. If fluid sensors are on, then the analyzer makes these procedures automatically, otherwise the User must initiate them activating the appropriate item within this submenu.

7.1.1.3   Draining chambers

Draining of chambers should be run before removal or replacement of parts related to the measuring chambers or apertures.

7.1.1.4   Reagent status

```
Reagent status
Reagent pack installed: 01.01.2004/Reagent pack
Samples:    0          Blanks:      0

Diluent  Lyse  Cleaner  L_VET5  Rinse  Waste
 9000    300     300     300     500   11000

100%   100%   100%   100%   100%    0%
```

The screen on the left shows reagent volumes in containers, as calculated by the instrument. As measurements are performed, the volumes are changing accordingly. When reagent volume in a container is running low, instrument will notify user, and ask replacement.

Press the ⬜▶▦ soft key, then press ☑ to confirm.
The *Abacus junior vet 5* updates the installation date, reagent lifetime, and the amount of reagent in each container.

WASTE HANDLING – VERY IMPORTANT

Waste contains poisonous substances (because of possible cyanide content) and human origin substances representing biohazard. These substances are representing potential danger to environment. For this reason, safe handling of the waste liquid is very important.

Please contact your distributor which kind of reagent is supplied to you, whether the lyse reagent contains cyanide or it is cyanide-free. Please, disregard point 1. below if your lyse reagent does not contain cyanide.

The following steps should be made for environmental protection and safety reasons:

1. Neutralization of waste containing cyanide:

- *Use the set of cyanide neutralizer reagents (contact your distributor):*

    Component A (alkaline oxidant reagent)
    Component B (neutralizer reagent)

- *Put 5 ml/l of component A into the waste container when it is empty, then connect it to the analyzer.*

- *When the waste container becomes full replace it.*

- *Wait 1-2 hours for oxidation to complete.*

- *Put 5 ml/l of component B into the waste container.*

- *Wait 2-3 hours.*
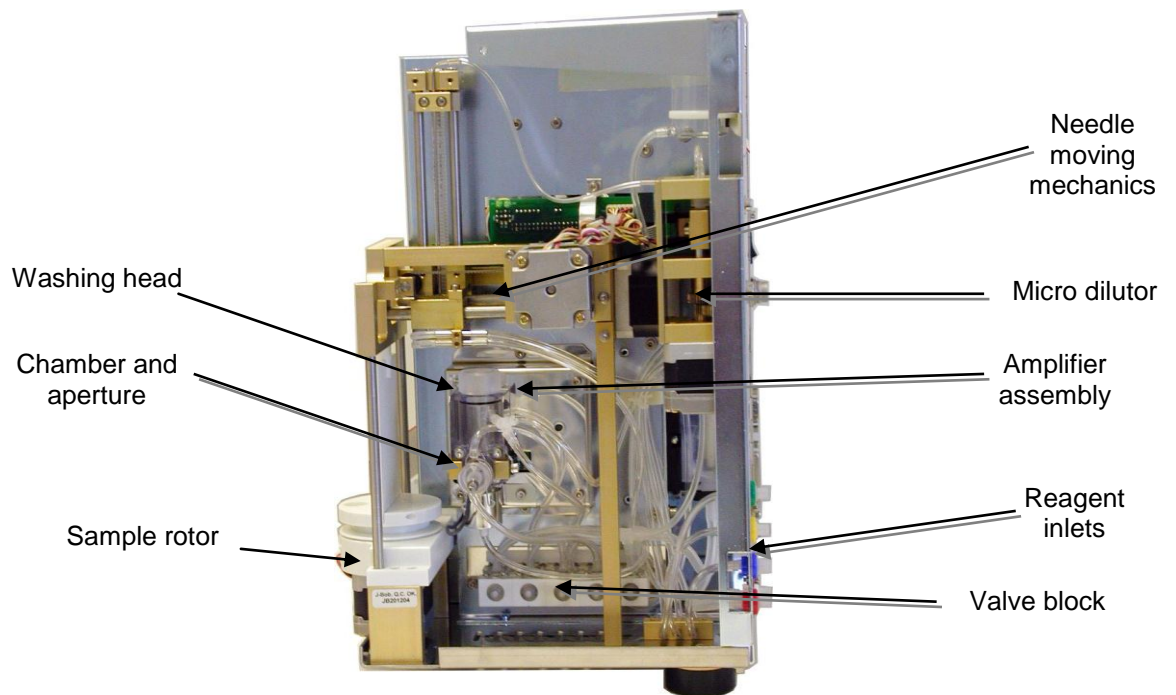
2. Neutralization of biohazard effect

- *Independently of the fact that the waste contains cyanide or not, you should make this step.*

- *Put 2 ml/l hypochlorite solution into the waste. Close the cap, shake the container and wait 1 hour.*

- *Dispose of waste by spilling it into the drain system.*

7.1.2   Weekly maintenance

Weekly maintenance should be performed before turning on the power switch.

- How to open the **side doors**:
On the left side and the rear side of both instruments there is a side door, which gives access to the fluidic system and the mechanical parts easily (Figure 11 and 12). Other parts of the analyzer (electronic parts, etc.) can be accessed by opening the front cover and the rear cover.

Figure 11-12.

Needle moving mechanics

Micro dilutor

Washing head

Amplifier assembly

Chamber and aperture

Reagent inlets

Sample rotor

Valve block

Reagent sensors

Valve block

Reagent connectors

Main dilutor

Peristaltic pump
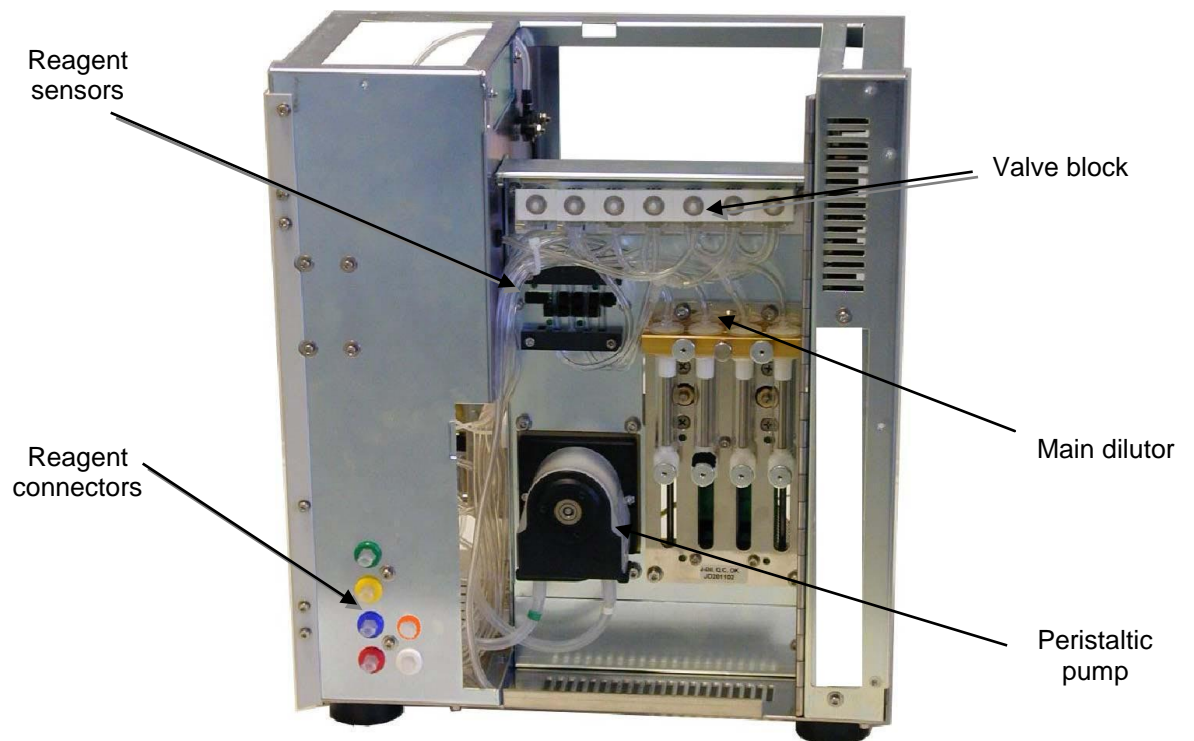
Cleaning the washing head

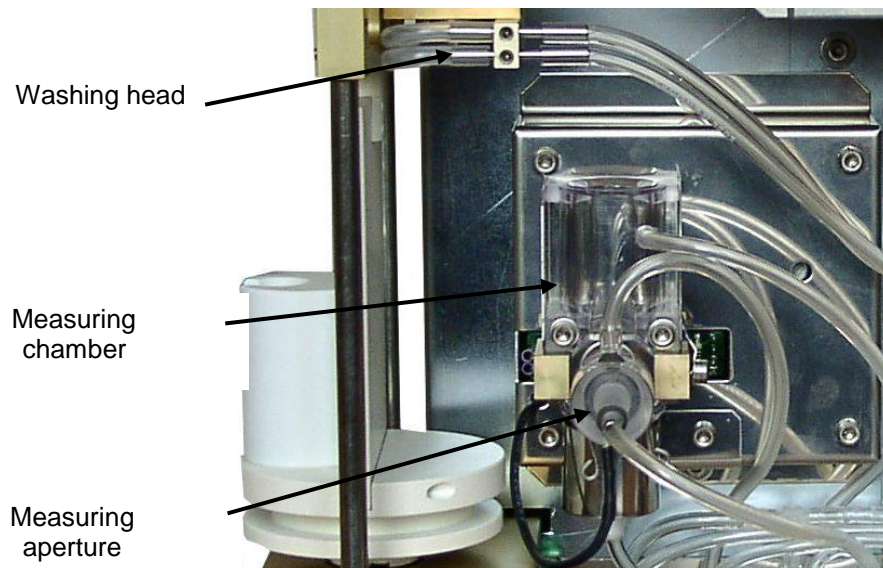The washing head cleans the outer surface of the aspirating tip with saline diluent. Any salt build-up on the lower surface may cause malfunction during operation. Use and a soft cloth dampened with water to clean this area. You can see the washing head indicated in the following figure:

Washing head

Measuring chamber

Measuring aperture

Figure13. Parts of measuring block

1. Exit the Measurement menu. Open the side door after the needle has stopped moving.

2. Gently rub the lower surface of the washing head to remove the salt build-up.

3. Close the side door.

Peristaltic pump maintenance

The pump installed in the instrument is maintenance free. However, would you experience leakage from the pump, or vacuum error, you may replace the tube used.
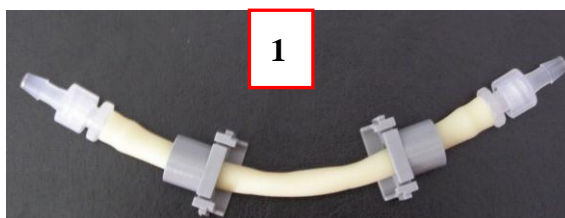
Remove the tubes from the pump by opening the screw connectors.
Push in the two sides of the pump cassette.
Pull the cassette off the pump.
Pushing aside the two tubes, bend the tube out of the pump.

Now you have the tube as figure 1 shows.

Using a standard screwdriver, ease the tube on the plastic connector, and pull the tube off. Repeat the same procedure on the other end of the tube.

Now you can pull the plastic holders off the tube. Retain all parts except the old tube.

Using the new pump tube, slide the two grey plastic parts onto the new tube. Make sure they are aligned as shown on figure 1. Insert the 2 white plastic connectors into the ends of the tube. The new set must look like the tube on figure 1.

Put the tube back into the pump mechanics, and drive the grey plastic parts into their seats as figure 2 indicates. (view from the "top" of the pump)
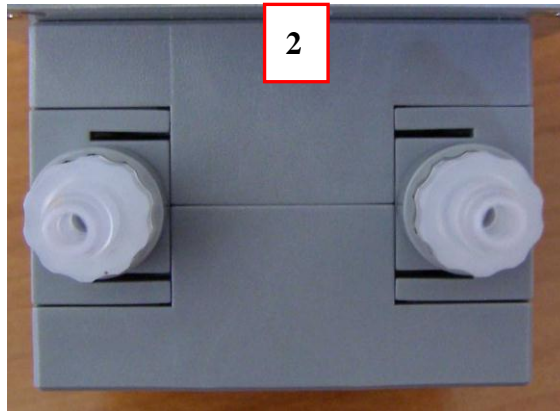
Slide the cassette housing back. There are pins on the cassette, make sure to drive them in their paths.

The cassette must click into its place.

7.2   Calibration

The *Abacus junior vet 5* is pre-programmed to monitor DiatroCont 5 control. Performing QC determinations regularly verifies continued optimal performance.

It is recommended to do calibration in the following cases:
1. At analyzer installation, before beginning the analyses.
2. After replacing any component, related to the process of dilution or measurement.
3. When quality control measurements show any systematic error (bias) or they are outside predefined limits.
4. At regular time intervals (determined by the lab itself).
5. If you want to use the instrument in Prediluted mode.

Calibration can be performed in two ways:
1. User can enter calibration factors - without any calibration measurements – using the numerical keypad.
2. One-, two- or three-fold measurements of control or special calibrations material with known parameters. In this case, the instrument automatically calculates new factors using the following formula:

$$\text{New factor} = \frac{\text{Assigned value x Stored factor}}{\text{Measured value(s) (or average of those)}}$$

CAUTION!   New calibration will invalidate the previous factors. Old values cannot be retrieved, but can be reviewed in the VIEW CALIBRATIONS menu.

Calibration can be initiated by choosing Calibration in the UTILITIES.

1. Select the calibrator:

Calibration	
1. Calibrate	▶
2. View Calibration History	
3. Calibration settings	▶

Calibrate
1. Control
2. Dog
3. Cat
4. Horse
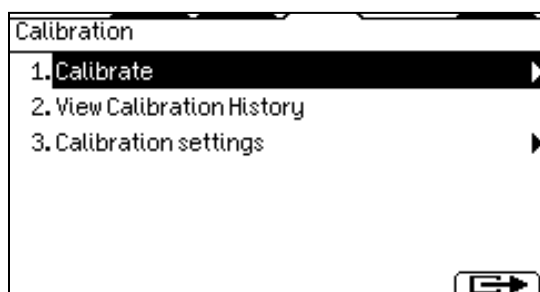
2. Enter the assay values for each parameter from the calibrator package insert.

Calibration			Calibration		
RBC	**1.00**		HGB	1.00	
MCV	1.00		WBC	1.00	
RDWc	1.00		EOS	1.00	
PLT	1.00		BAS	1.00	
MPV	1.00				

3. When all parameters are set, press the [✔] soft key.

The display shows **Calib:(1/1)** at top left.

Target values for calibrated parameters can be set within the following ranges:

Parameter	Low limit	High limit
RBC	1.00	8.00
HCT	0.1	0.6
MCV	50	120
RDW CV	10	50
PLT	30	800
PCT	0	2
MPV	5	15
PDW CV	5	50
HGB g/l	30	300
WBC	1.0	30.0

Table 7. Calibration ranges

9. When analysis is complete and the display shows the results, press [✔].
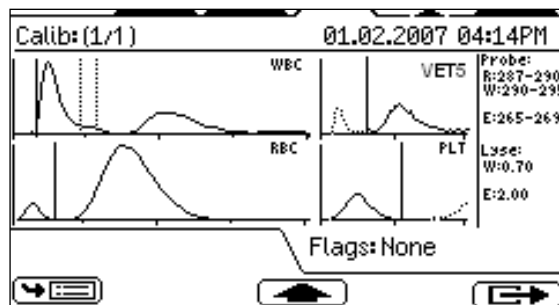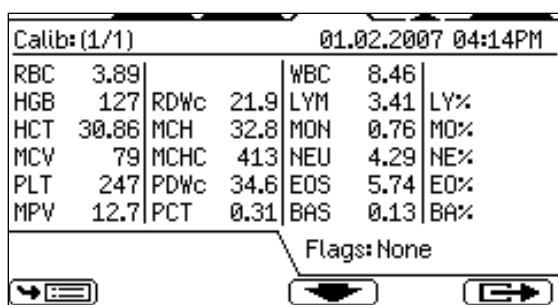
Abacus junior vet 5 calculates and displays the new calibration factors.
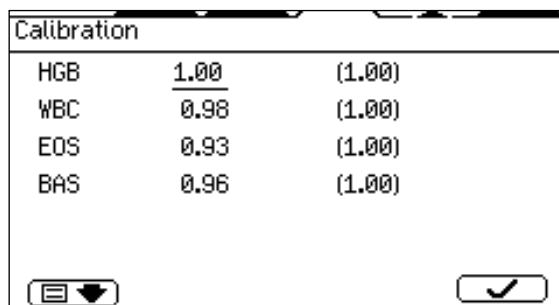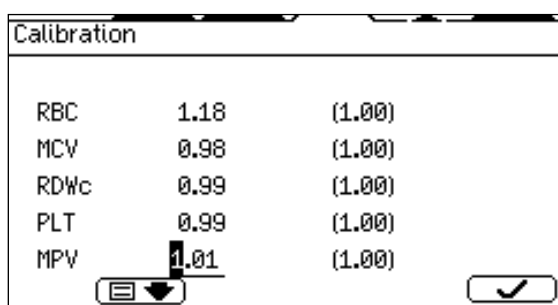
7.3   Quality Control Procedure

By analyzing control materials, day-to-day reproducibility can be monitored. In this submenu, both target values and acceptable ranges for each parameter can be specified for different QC levels.

NOTE: **Target values of the control material should be set only once, at the beginning of the QC measurements. Resetting parameters deletes previous QC results of the active level.**

CAUTION!   **Any change in the QC material setting deletes previous QC results. It is strongly recommended to print results prior to changes.**

---

1. In the Quality Control menu select **Set QC reference ranges:**
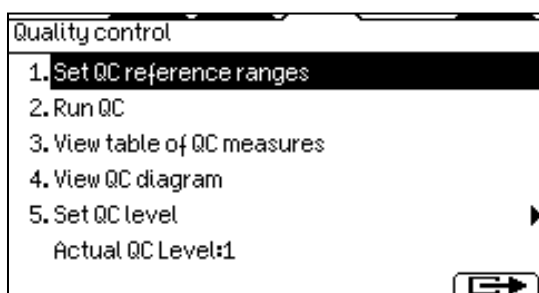
2. QC Reference values:

QC reference values

QC Type:		1
LOT No.:	0703-012N	
Exp. date:	02.08.2007	
Lyse	0.70 ml	
WBC	7.30 +- 0.80 10^9/l	
RBC	4.46 +- 0.20 10^12/l	

3. Entert the value ranges for each test parameter as indicated on the paperwork accompanying the QC lot number you are using.

- use the keypad to change displayed values.
- to disable QC of a parameter, set it to 0.0
- use the PGDN and PGUP to view additional parameters.

4. Press [✔] to accept the data, then press [✔] to confirme.

5. Select Run QC to start the analysis. Press the Start button.
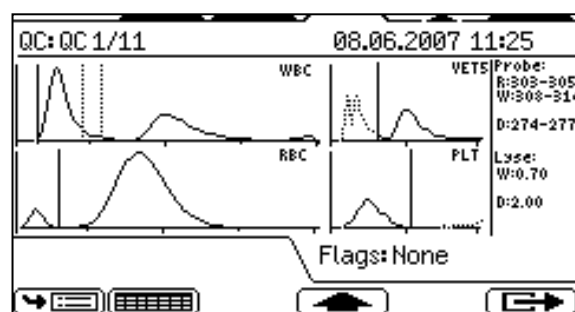
Press [✔] to accept the results and save them in the QC database

Viewing the Accepted QC Database

1. Press the Utilities key, then select Quality Control.

2. Select **View table of QC measures.**

PatID	SmpID	Date	
☐QC 1/06	QC 1/06	08.06.2007	11:06
☐QC 1/07	QC 1/07	08.06.2007	11:10
☐QC 1/08	QC 1/08	08.06.2007	11:13
☐QC 1/09	QC 1/09	08.06.2007	11:17
☐QC 1/10	QC 1/10	08.06.2007	11:21
☐QC 1/11	QC 1/11	08.06.2007	11:25

7.4   Diagnostics

Devices
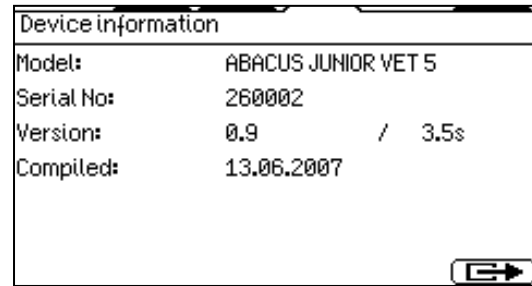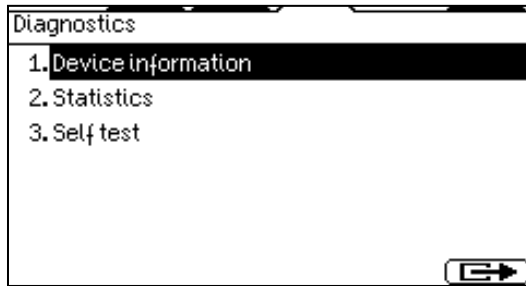
Self Test

The Self test is a procedure to verify proper operation of essential components of the instrument.

The Self test should be performed:

- At installation.
- After replacing any component.
- After extended time out of use.

1. Press the **Utilities** key and select **Diagnostics.**

2. Select **Self test.** *Abacus junior vet 5* then lists and checks subsystems.

3. When the test is finished, the *Abacus junior vet 5* displays a summary of the results.
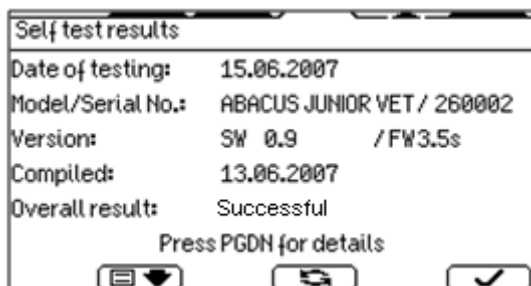
7.5   Settings

Selecting item four (4) of the UTILITIES you can access this menu.
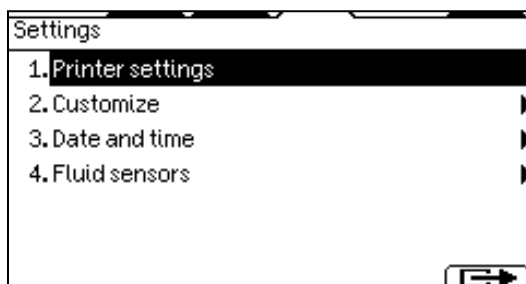
7.5.1 Printer settings

The following table lists the available printer selections, along with the printer language and specific printer models corresponding to each.

Table 3-1: Compatible Printers

Printer Selection	Printer Language	Supported Printer Models
Seiko LPTH245 Built in	Special printer language	Built-in thermal printer
Epson ESC/P Raster	Epson ESC/P Raster	Epson Stylus series (select models only)
Canon BJC in 9-pin mode Canon BJC	Canon BJC	Canon BJ and BJC series (select models only)
HP DeskJet	PCL4	HP DeskJet series (select models only)
HP LaserJet	PCL4	HP LaserJet series and compatibles (LJ1100, etc.)
Epson 24-pin in 9-pin mode, Epson 24-pin	ESC/P2	Epson 24-pin dot matrix series (LQ-580, Epson 440, etc.)
Epson 9-pin	ESC/P	Epson 9-pin dot matrix series (FX-980, etc.)

To set up the instrument for your printer, go to the "**Utilities/Printer/Printer Settings**" menu. Select from the options using the up and down arrow keys within the text fields, and fill in the numerical fields using the number keys.

The general characteristics of the printable area of printer paper are below:

The paper is defined by its size: it can be a standard size (A4, Letter) or any custom sized paper (specify the actual size).

Printers cannot print on the whole surface of the paper. The blank area is described by the physical **Margin**s, which may vary by printer models. The paper area inside the physical margins is called the *printable area*.

Top margin and **Left margin** settings are used for determining the location of printed results on the page.

If more than one result is to be printed per sheet, use the **Vertical spacing** to specify the distance between reports.

On the first page of the Printer Settings sub-menu, printer type can be selected. Here you can choose between Seiko built-in printer, or any compatible external printer.

Initially, only the printer driver can be selected, and when accepted, driver and printout format details become available.

```
┌─────────────────────────────────────┐
│ Choose printer type                 │
├─────────────────────────────────────┤
│ Printer:      Seiko LPTH245 Built in  ↕│
│                                     │
│                                     │
│                                     │
│                                     │
│                                     │
│                    ( ✗ )( ✓ )       │
└─────────────────────────────────────┘
```
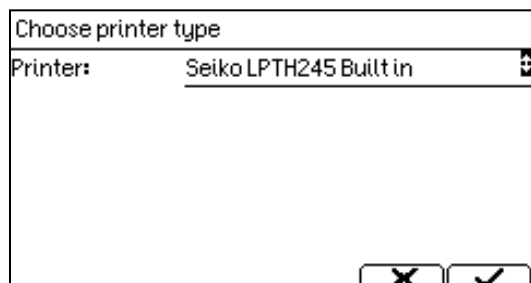
Select the **Printer** matching your printer hardware. Pressing the [✓] key will bring up printout details dialogs.

❑ Printout format: **Narrow full** (with histograms), or **Narrow text only** (without histograms)

❑ Table format: **Normal** or **Narrow**

❑ Printer cable: **COM2**

❑ Paper: **RollPaper**

❑ Units: **inch** or **cm**

❑ Paper size: **2.24 x 50.00**

❑ Left margin: **0.00**
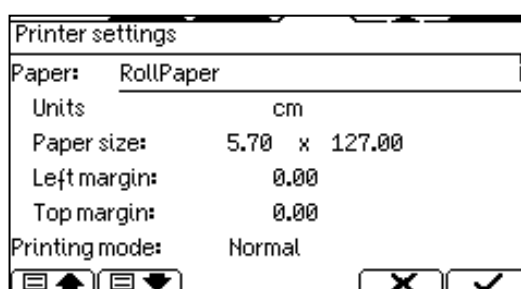
❑ Top margin: **0.00**

❑ Printing mode: **Normal**

```
┌─────────────────────────────────────┐
│ Printer settings                    │
├─────────────────────────────────────┤
│ Paper:    RollPaper               ↕ │
│  Units              cm              │
│  Paper size:     5.70  x  127.00    │
│  Left margin:        0.00           │
│  Top margin:         0.00           │
│ Printing mode:    Normal            │
│ (▤▲)(▤▼)         ( ✗ )( ✓ )         │
└─────────────────────────────────────┘
```

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- Physical margin: **normal**
- One result per page: **No**
- Rollpaper: **Yes**
- Vertical spacing: **1.27**
- Autoprint: **Yes**
- Limits format: **L Graph H**

```
Printer settings
Physical margin:        Normal            ▮
One result per page:              No
Rollpaper:                  Yes
Vertical spacing:                1.27
Autoprint:                  No
Limits format:              L Graph H
(≡▲)(≡▼)          ( ✗ )( ✓ )
```

- Print flags: **Yes**
- Print warning flags: **Yes**
- Clogging report: **No**
- Serial number on result: **Yes**

```
Printer settings
Print flags:                Yes      ⬆
Print warning flags:        Yes
Clogging report:      No
..............................................
Serial number on result:        Yes


(≡▲)                ( ✗ )( ✓ )
```

■ For an external printer, the following default settings are recommended:

❏ Printout format: **Full with histograms**, or **Wide text only** (results are printed without histograms)

❏ Paper: select as appropriate for your printer (**Note:** Never select **Rollpaper** for an HP LaserJet.)

❏ Left and top margins: **1.00**

❏ Rollpaper: **No** (especially for HP LaserJets)

Configure any other settings as needed. See Table 3-2 for a complete list.

Table 3-2: Printer Settings

Setting	Description
Printer	Printer used with the VET5 — see Table 3-1.
Printout format	Overall format used for printouts. Available selections depend on the selected **Printer**. (See page 3-6 for examples.)
Table format	Printed width of tables included in the printouts.
Printer cable	Interface used for an external printer: LPT (parallel) or USB.
Paper	Paper type used in the selected **Printer**.
Units Paper size Left margin Top margin	Default units of measure, paper size, and print margins for the selected **Paper**. These can be customized if you're using a non-standard paper. Left and top margins control the position of printed results on the page.

Table 3-2: Printer Settings

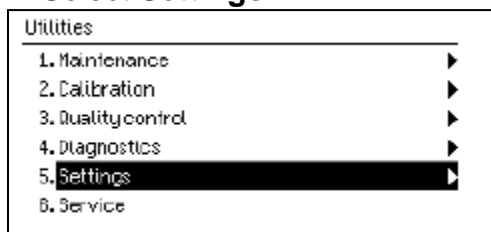| Setting	Description
Printing mode	Overall printout size (**Mini**, **Small**, **Normal**, **Enhanced**, or **Large**), width (**Wide** or **Narrow**), and print speed (Fast). The available modes depend on the selected **Printer**.
Physical margin	Margin correction for printers that have smaller printable areas than usual. Use **Normal** unless the right edge of the printed text is missing or appears in the next line.
One result per page	Select **Yes** to print each analysis on a separate page.
Rollpaper	Select **Yes** if using the built-in printer.
Vertical spacing	The vertical distance between printed results when multiple reports are printed on each page.
Autoprint	Select **Yes** to print all results automatically after each analysis.
Limits format	The format for printing the reference ranges: • To print numeric values, select the displayed range (for example, [4.51…5.64]). • **None** prints no range values. • **Graphical** prints a graph showing where the results falls in range. • **L-H Graph** prints the low and high limits of the range, followed by a graph showing where the result falls in the range. • **Graph L-H** prints a graph showing where the result falls in the range, followed by the low and high limits of the range, • **L Graph H** prints the low limit of the range, a graph showing where the result falls in the range, and the high limit of the range.
Print flags	Select **Yes** to include in the printout any measured values that fell outside the reference range, as well as any errors during analysis.
Print warning flags	Select **Yes** to include in the printout all flags that appeared in the results.
Clogging report	Select **Yes** to include information on aperture clogging on all printouts.
Serial number on result	Select **Yes** to include the **VET5**'s serial number on all printouts.

Press the ☑ soft key to accept the settings.

7.5.2 Customize

Use the Customize menu to set the language and date format used by the *Abacus junior vet 5*, along with the screen saver delay, and the date range used for printing combined results from the *Abacus junior vet 5*.

1. Press the **Utilities** key.

2. Select **Settings**

```
Utilities
1. Maintenance          ▶
2. Calibration          ▶
3. Quality control      ▶
4. Diagnostics          ▶
5. Settings             ▶
6. Service
```

3. Select **Customize**

```
Settings
1. Printer settings
2. Customize            ▶
3. Date and time        ▶
4. Fluid sensors        ▶

                    [ ⇥ ]
```
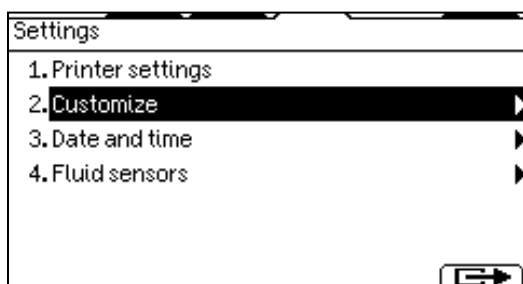
4. Select **General Settings**

```
Customize
1. General Settings
2. Units
3. Laboratory
4. User modes           ▶

                    [ ⇥ ]
```
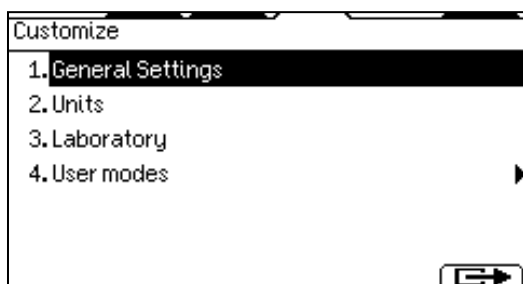
This is a collection of settings influencing instrument operation, customization.

```
General settings
Language:              English    ▾
PC Link:               Offline
Serial Protocol Version: 2.20
Serial's Decimal Dot   lang def
VSx Link:              Offline
Date format of VetScan DD/MM/YY
   [ ☰ ▼ ]          [ ✗ ][ ✓ ]
```

Table 3-4 describes the available settings.

Table 3-4: General Settings

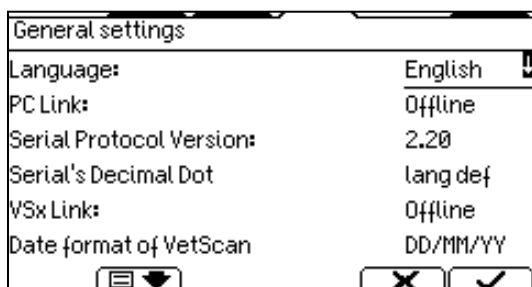| Screen saver wait time	0 to 30 minutes (0 = screen saver off)
Language	English. International customers: please contact your distributor for information about available languages.
PC Link	Offline, USB, Baud rate (150 to 115200). Protocol used by the VET5 to communicate with a connected computer. – If the VET5 is not connected to a computer, choose Offline. – If the VET5 is connected to a computer using a USB cable, choose USB.
Serial Protocol Version	1.0, 1.7, 2.20, 2.23, 3.0, or 3.1. Protocol versions used by practice management software to interface with the .
Serial's Decimal Dot	Dot (period), slash, comma, or lang def (as defined by language)

VSx Link	Offline, USB, RS232. Protocol used by the Vet5 to communicate with a connected VetScan Classic or VS2 for combining results. – If the Vet5 is not connected to a VetScan Classic or VS2, choose Offline. – If the Vet5 is connected to a VetScan VS2 through a USB cable, choose USB. – If the Vet5 is connected to VetScan Classic through a serial cable, choose RS232
Date format of VetScan	When printing combined Vet5 and VetScan results, the date format used by the VetScan: MM/DD/YY or DD/MM/YY (DD = date, MM = month, YY = year). Set both instruments to the same format.

7.5.3 Units

Use the unit menu to set the measurement units the *Abacus junior vet 5* will use.
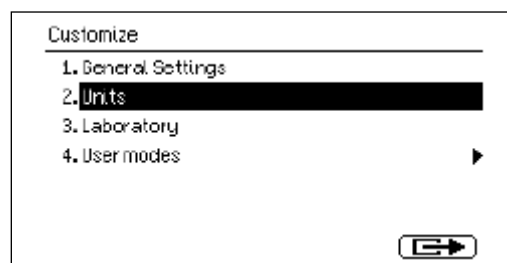
1. Press the Utilities key ⊙

2. Select **Settings.**

```
Utilities
 1. Maintenance                    ▶
 2. Calibration                    ▶
 3. Quality control                ▶
 4. Diagnostics                    ▶
 5. Settings                       ▶
 6. Service
```

```
Customize
 1. General Settings
 2. Units
 3. Laboratory
 4. User modes                     ▶

                          ⊏➔
```

3. Select **Customize.**

```
Units

Count unit          cells/l        ■
HGB unit            g/l
PCT, HCT unit       %
RDW, PDW mode       cv

                        ✗   ✓
```

4. Select **Units.**

5. Set the units as needed:

   ■ Use the ◁ and ▷ keys to select a unit.

   ■ Use the △ and ▽ keys to select a setting for that unit.

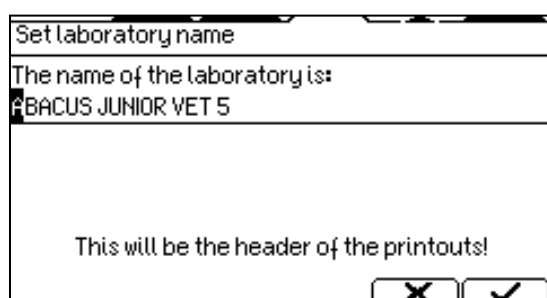Table 3-5 lists the available unit settings.

Table 3-5: Units

Count unit	cells/liter (**cells/l**), cells/µl (**cells/µl**). "**Prec.**" displays a more precise value.
HGB unit	grams/liter (**g/l**), grams/deciliter (**g/dl**), millimols/liter (**mmol/l**)
PCT, HCT unit	percentage (**%**), absolute (**abs**)
RDW, PDW mode	standard deviation (**sd**), coefficient of variation (**cv**)

6. Press the [✔] on-screen key to save the settings.

Laboratory information settings

Enter your clinic or laboratory information as follows, to be printed automatically on report headers. You can also use this procedure to edit or change this information.

Enter the name and address of your clinic or laboratory. Press OK to move to the next line. You can enter up 40 characters in each line.

```
Set laboratory name
The name of the laboratory is:
ABACUS JUNIOR VET 5



      This will be the header of the printouts!
                              [ ✖ ][ ✔ ]
```
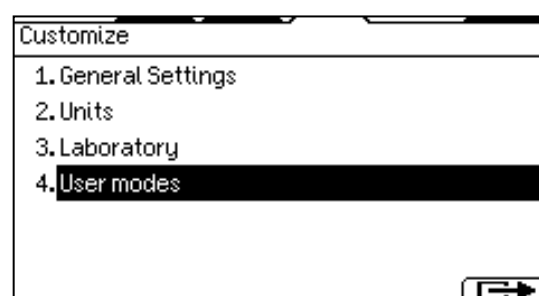
Press   [✔] to accept the settings.

User mode settings

If you want to require users to log in and enter passwords to use **Abacus junior vet 5**, and to be able to track individual usage of the unit, you can enable the **Abacus junior vet 5**'s Multi user mode. This will require each user to have a unique user ID and password.

1. Press the **Utilities** key.

2. Select **Settings.**

3. Select **Customize.**

4. Select **User mode.**

```
Customize
  1. General Settings
  2. Units
  3. Laboratory
  4. User modes              ▶



                          [ ⤶ ]
```

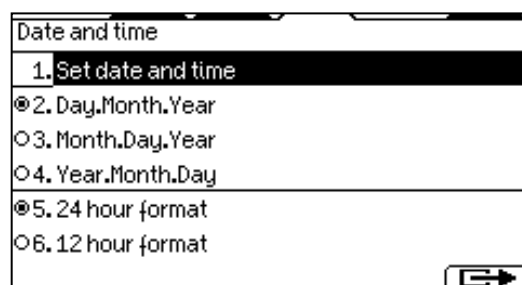5. Follow the on-screen instructions to enable multi user mode, to add or modify users, or to change a user's password.

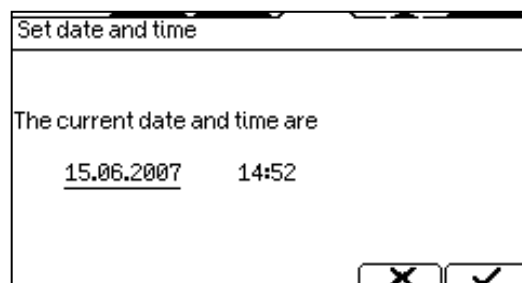User modes
● 1. Single user mode
○ 2. Multi user mode
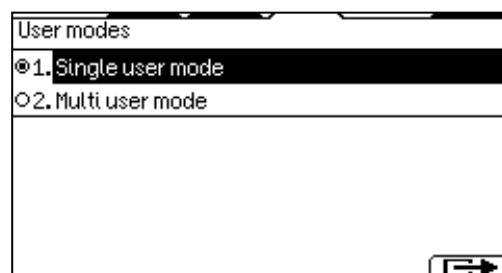
7.5.4 Date and time

The date and time of each analysis is stored with the results. This menu allows setting the built-in clock and the format of the date displayed.

1. Press the **Utilities** key, and then select **Settings**.
2. Select **Date and time.**
3. Select Set date and time.

Date and time
1. Set date and time
● 2. Day.Month.Year
○ 3. Month.Day.Year
○ 4. Year.Month.Day
● 5. 24 hour format
○ 6. 12 hour format

4. Type in the date and time, then press ✔.

Set date and time

The current date and time are

15.06.2007   14:52

✗ ✓

5. Select formats for displaying the date (item 2, 3 or 4) and time (item 5 or 6), then press ✔.

Date and time
1. Set date and time
● 2. Day.Month.Year
○ 3. Month.Day.Year
○ 4. Year.Month.Day
● 5. 24 hour format
○ 6. 12 hour format
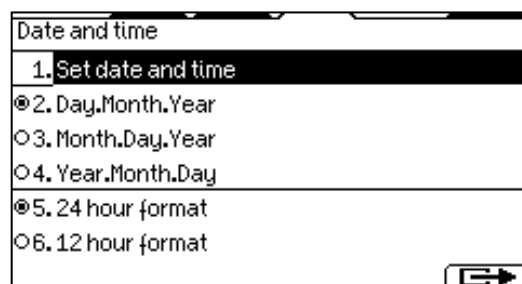
6. Press ✔ to accept the settings.

8. Printing

This chapter covers information on making reports on measured samples.

8.1   Printouts

When required, the following items can be sent to an external printer or to a built-in printer by pressing the function key button.

* Database result(s) (table format)
  * Database (specified patient results with histograms)
  * QC result (Levey-Jennings chart)
  * QC result(s) (table format)
  * Calibration results
  * Last measured blank result
  * Last measured patient result (with histograms)
  * Last measured QC result
  * Device information and statistics
  * Self test result
  * Set parameters

The appropriate printout format can be selected in UTILITIES/SETTINGS/PRINTER SETTINGS).

Thermal paper printout

```
                ABACUS JUNIOR VET 5




    Patient ID:
      3590
    Name:


    Mode:
      Horse
    Doctor:


                        / -
    Birth/Sex:          00.00.0000
    ─────────────────────────────────────────
    Report date:        20.06.2007 S/N:260005
    Test time:          12.06.2007 16:45
    Test    Result      Sample ID:  37
    ─────────────────────────────────────────
    WBC     9.03    10^9/l    5.4 ⊏══ 14.3
    LYM     2.68    10^9/l    1.5 ⊏══ 7.7
    MON     0.47    10^9/l        ⊏══ 1.5
    NEU     5.61    10^9/l    2.3 ⊏══ 9.5
    EOS     0.25    10^9/l    0.1 ⊏══ 1
    BAS     0.03    10^9/l        ⊏══ 0.5
    LY%     29.7 -  %         17 ⊏══ 68
    MO%     5.2     %            ⊏══ 14
    NE%     62.1    %         22 ⊏══ 80
    EO%     2.8     %          1 ⊏══ 8
    BA%     0.3     %            ⊏══ 3
    ─────────────────────────────────────────
    RBC     9.88    10^12/l   6.8 ⊏══ 12.9
    HGB     171     g/l       110 ⊏══ 190
    HCT     42.54   %         32 ⊏══ 53
    MCV     43      fl        37 ⊏══ 59
    MCH     17.3    pg        12.3 ⊏══ 19.7
    MCHC    401 +   g/l       310 ⊏══ 390
    RDWc    22.3    %
    ─────────────────────────────────────────
    PLT     79 -    10^9/l    100 ⊏══ 400
    PCT     0.05    %
    MPV     6.3     fl
    PDWc    32.6    %
```
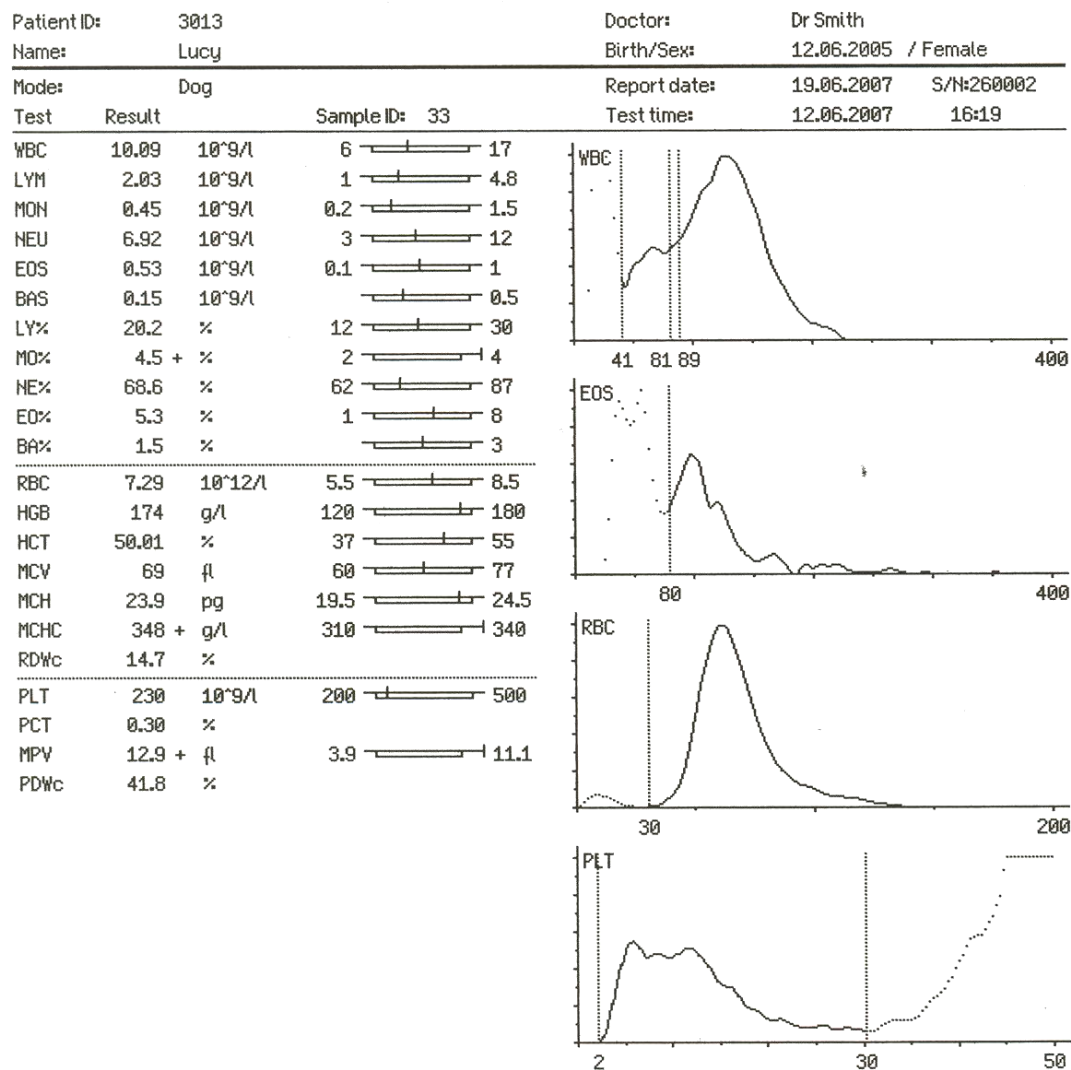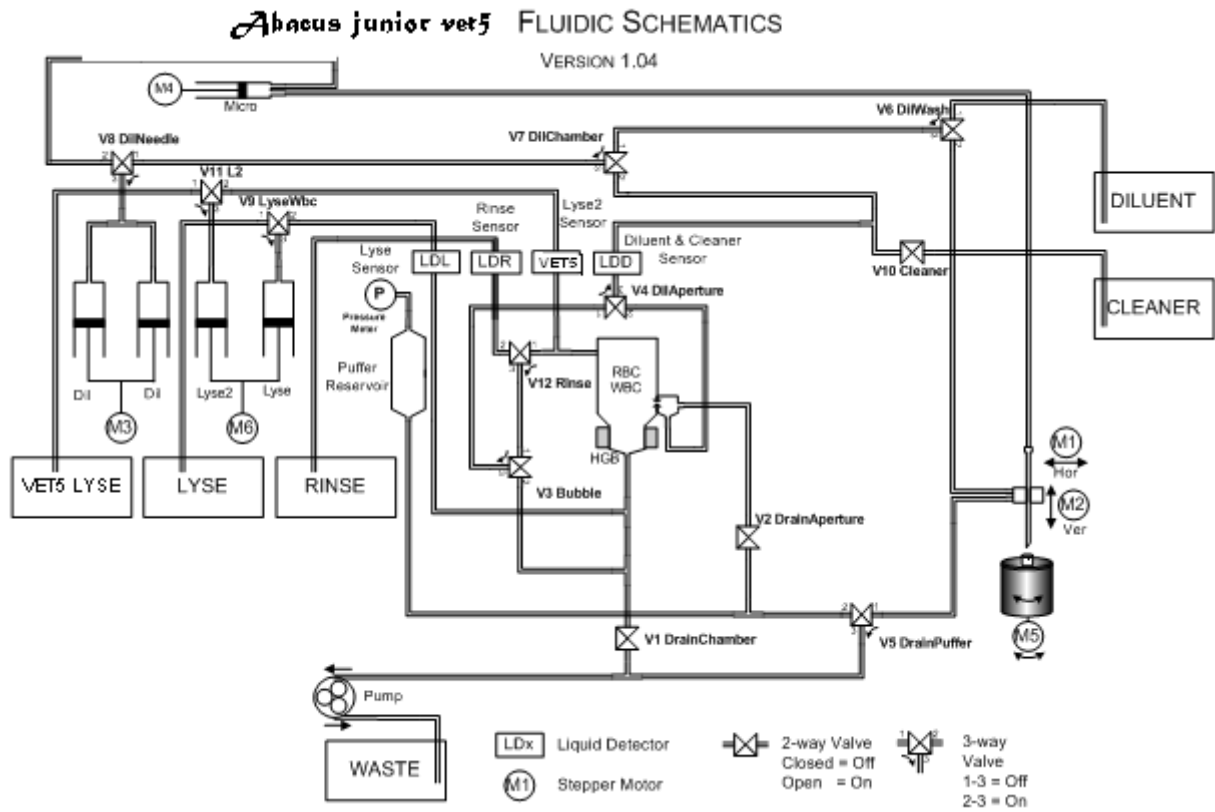
Letter printout

ABACUS JUNIOR VET 5

Patient ID:	3013			Doctor:	Dr Smith	
Name:	Lucy			Birth/Sex:	12.06.2005 / Female	
Mode:	Dog			Report date:	19.06.2007	S/N:260002
Test	Result		Sample ID: 33	Test time:	12.06.2007	16:19

Test	Result			
WBC	10.09	10^9/l	6	17
LYM	2.03	10^9/l	1	4.8
MON	0.45	10^9/l	0.2	1.5
NEU	6.92	10^9/l	3	12
EOS	0.53	10^9/l	0.1	1
BAS	0.15	10^9/l		0.5
LY%	20.2	%	12	30
MO%	4.5 +	%	2	4
NE%	68.6	%	62	87
EO%	5.3	%	1	8
BA%	1.5	%		3
RBC	7.29	10^12/l	5.5	8.5
HGB	174	g/l	120	180
HCT	50.01	%	37	55
MCV	69	fl	60	77
MCH	23.9	pg	19.5	24.5
MCHC	348 +	g/l	310	340
RDWc	14.7	%		
PLT	230	10^9/l	200	500
PCT	0.30	%		
MPV	12.9 +	fl	3.9	11.1
PDWc	41.8	%		

9. Fluidic Schematics

Abacus junior vet5 FLUIDIC SCHEMATICS
VERSION 1.04

10.   Warning labels on the analyzer

Label	Meaning	Explanation	Chapter
	Biohazard	The sample and the waste are potentially infectious material	2.2.4
	Corrosive	Reagents may cause corrosion or skin irritation.	2.2.4; 2.3
	Warning	General warning of injury.	
	Sharp needle warning	The sampling needle may cause injury.	5.2.3

Table 6. Warning labels